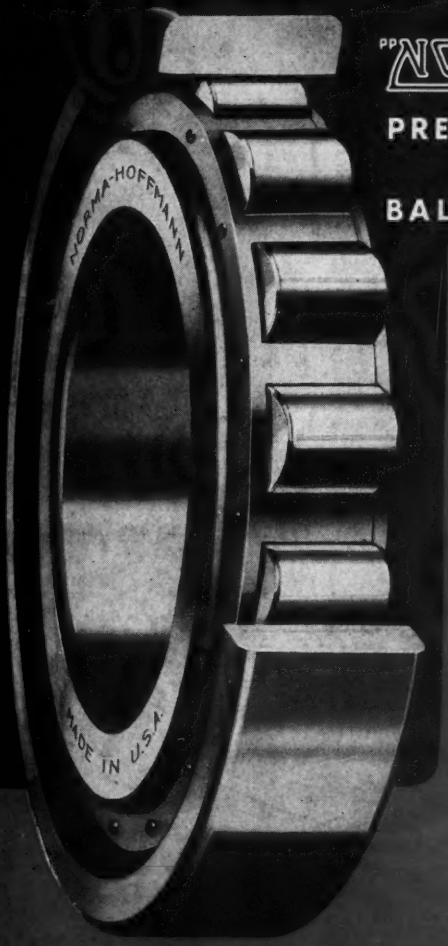
MODERN
Machine Shop
January, 1940

For Your HEAVY-DUTY JOBS



"NORMA-HOFFMANN"

PRECISION ROLLER BEARINGS
MADE TO
BALL BEARING DIMENSIONS

Interchangeable with standard single-row ball bearings, these heavy-duty high-speed units require no increase in housing dimensions, although they will give you, size for size, a much greater steady load capacity and a momentary overload capacity 50% beyond normal rating, as well as greater resistance to shock or vibratory loads. Furthermore, their speed-ability equals that of ball bearings up to 35,000 R.P.M.

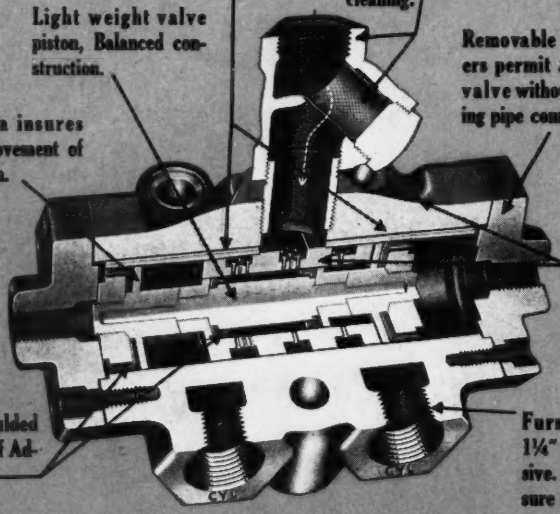
Give your machines this extra safety factor. Write for the Catalog. Let our engineers work with you.

NORMA-HOFFMANN BEARINGS CORP'N, STAMFORD, CONN., U. S. A.

POSITIVE ACTION

MASTER CONTROL VALVE

NEW & IMPROVED FEATURES



Air inlet to operating ends of valve piston.

Built in strainer furnished with valve. Easily removed for cleaning.

Light weight valve piston, Balanced construction.

Removable end covers permit servicing valve without breaking pipe connections.

Large area insures positive movement of valve piston.

Bronze liner and body. Corrosion resistant materials throughout.

Composition moulded cup packings, Self Adjusted by air.

Furnished in ¼" to 1¼" pipe sizes inclusive. Operating pressure 30 to 150 lbs.

Model 6245 Master Control Valve, illustrated, is used in conjunction with Bleeder Valves for Remote Air Operating Systems. Write for Bulletin 371 giving complete information.

6245 AIR CONTROL VALVE

"LOGAN"

LOGANSPORT MACHINE, INCORPORATED

901 Payson Road, LOGANSPORT, INDIANA

Manufacturers of Air and Hydraulic Devices, Chucks, Cylinders, Valves, Presses and Accessories

J



Atlas Bench Lathe manufactured by Atlas Press Company, Kalamazoo, Michigan. Spindle equipped with TIMKEN Bearings.

"Educated" BENCH LATHE

DOES BETTER WORK FASTER . . . .

The Atlas Bench Lathe has a "good head" on it. A "good head" in this case includes a Timken Bearing Equipped spindle. Such a head gives any bench lathe a big advantage over machines not so equipped—in both *precision* and *speed*.

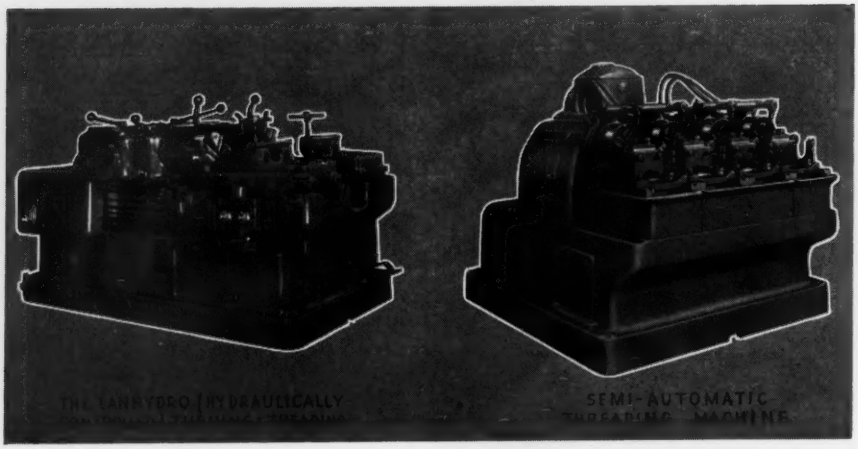
Bench lathes equipped with TIMKEN Bearings have been aptly described as "tool room lathes in miniature," so accurate is their performance. Isn't this the kind of performance you want in *your* new bench lathe? Specify "Timken Bearing Equipped" and you'll be sure of getting it.

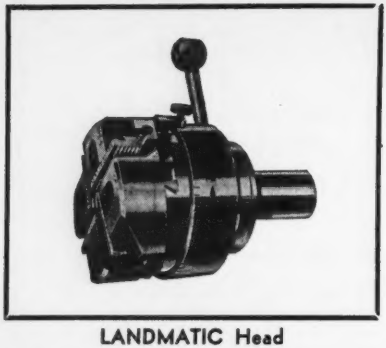
THE TIMKEN ROLLER BEARING CO., CANTON, OHIO

Manufacturers of TIMKEN Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; TIMKEN Alloy Steels and Carbon and Alloy Seamless Tubing; and TIMKEN Rock Bits.

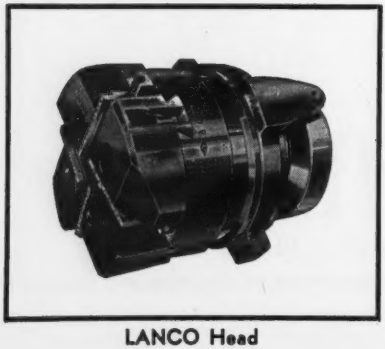
TIMKEN
TAPERED ROLLER BEARINGS

Profit Makers





LANDMATIC Head



LANCO Head

LANDISIZE

The LANDIS LINE
where it completely
as thread cutting re-
Die Heads—for any kind of application
Threading Machines—for jobbing, main-
for cutting either straight or tapered

LANDIS THREADING DIE
and THREADING MA-
produce threads of fine
basis to assure *low thread-*
it's the way to greater

LANDIS MACH

INCORP

WAYNESBORO

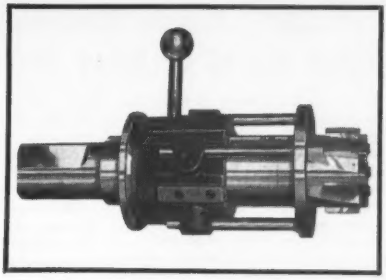
for 1940



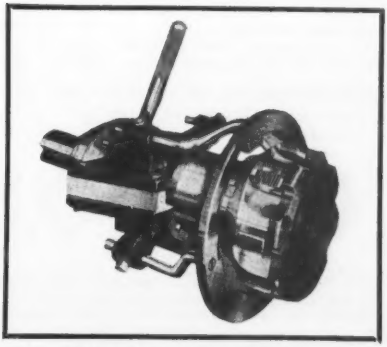
your THREADS

has grown to the point
covers the field insofar
quirements are concerned
and for all threading requirements
tenance, and production work, and
threads.

HEADS, COLLAPSIBLE TAPS,
CHINES have the ability to
accuracy on a high production
ing cost. Buy LANDIS—
profits in 1940.



Style LT—Collapsible Tap

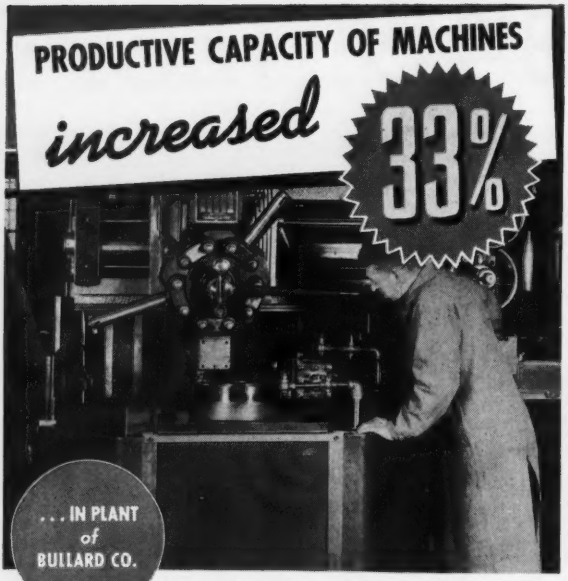


Style LM—Collapsible Tap

INE COMPANY

ORATED

PENNSYLVANIA



Simple Plan Adopted Permits Broad Use of Carboloy Throughout Shop

At the Bullard plant, Bridgeport, Connecticut, quantities to be machined are limited principally to small lots—6 to 200 pieces—usually steel, cast iron or bronze. Bullard . . . familiar with the unusual savings of Carboloy tools on quantity-production jobs tooled up for purchasers of their machines . . . sought some way to obtain comparable savings on their own limited quantity, diversified machining work. Problem was to maintain a reasonably low inventory of carbide grades and tools but at the same time adequate to cover a wide variety of jobs.

To accomplish this, Bullard selected two general purpose Carboloy grades—one for steel—one for all other metals and non-metallics. They then analyzed tool styles used, were able to design six styles of tools in four sizes to cover the majority of their applications.

With these basic problems solved, Bullard delegated one man to actively promote and follow up carbide tool use. Tooling then started on a broad scale.

Results to date: Machines tooled with Carboloy have shown an *average* increase of 33% in productive capacity. The complete story—including a record of savings on 22 steel jobs—will be mailed upon request.

CARBOLOY COMPANY, INC., 11143 E. 8 Mile Blvd., DETROIT, MICHIGAN

CHICAGO • CLEVELAND • NEWARK
PITTSBURGH • PHILADELPHIA
WORCESTER, MASS.

Canadian Distributor:
Canadian General Electric Co., Ltd.,
Toronto, Canada

CARBOLOY

REG. U.S. PAT. OFF.

TUNGSTEN CARBIDE—TANTALUM CARBIDE—TITANIUM CARBIDE

FOR CUTTING, DRAWING, SHAPING, EXTRUDING METALS AND NON-METALLICS
★ FOR REDUCING WEAR ON EQUIPMENT OR PRODUCTS YOU USE OR MAKE ★

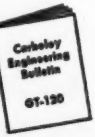
Carboloy Stocks Standard Tools and Blanks for Immediate Delivery. Carboloy Standard tools (Catalog M-37) consist of nine styles, suitable for a wide range of general purpose turning, facing and boring operations. Each style is so designed that each is adaptable to a large variety of work. This feature is of particular value for small run job-lot work, as tool cost can be absorbed over a number of jobs.

15% Discount On Standard Carboloy Blanks. Standard blanks (Catalog M-37) are available in 152 sizes, 3 styles as shown below. Priced 15% less than special blanks, these can be used on more than 90% of all Carboloy cutting tool applications. When slight adjustments in tool design are necessary to employ standard blanks they usually can be made without affecting purpose of the tool.



R-100 R-200 R-300

Steel Cutting Recommendations Contained In New Carboloy Bulletin. A new engineering bulletin recently issued contains basic data on requirements for cutting steel with Carboloy tools. Gives tool design, set-up, coolants, chip breaking and machine requirements. Particularly valuable is a table giving specific recommendations for speeds, feeds, Carboloy grades, tool rakes and angles, etc. Ask for Carboloy Bulletin No. 120.



Carboloy Masonry Drills. Tell your maintenance man about the Carboloy Masonry Drill. Drills concrete, brick, tile, etc., 75% faster than old methods. Ask for leaflet GT-103.

MODERN Machine Shop

HOWARD CAMPBELL, Editor

Volume 12 JANUARY, 1940 Number 8

Published monthly by
Gardner Publications, Inc.
431 Main St.,
Cincinnati, Ohio

DON G. GARDNER
President and
General Manager

JOHN M. KRINGS
Advertising Manager

GEORGE E. HAY
431 Main St., Cincinnati
Main 0182

G. M. FILLMORE
342 Madison Ave.,
New York
Murray Hill 6-3899

GEO. H. MEYERS
Tribune Tower, Chicago
Superior 2290

Member

ECA

Copyrighted

CONTENTS

Building "International" Trucks 61
By HOWARD CAMPBELL

Apprenticeship and Executive Training Methods at Mergenthaler Linotype Company 82
By GEORGE W. ALLISON

Practical Heat Treating, III 104
By FREDERICK TAYLOR POTTER

Ideas From Readers

—Bench-Type Slotting Fixture 128
By CHAS. H. WILLEY

—Protection for Threaded Work When Chucking 128
By A. H. WAYCHOFF

—Drill Hardening with Mercury 130
By ROBERT GRIMSHAW

—Portable Racking Blocks 130
By JOSEPH C. HART

—Gages for Checking Rolled Thread on Brass Pressure Cylinder 132
By JOHN A. HONEGGER

Over the Editor's Desk 140

New Shop Equipment 142

Catalog Library 216

Services Directory 218

"There's One in Every Shop" 220
By WESSER

Index to Advertisements 222

(Entered as third-class matter at Cincinnati, O., under Section 574½ P.L.&R., Act of June 5, 1934)

Circulation This Issue More than 28,500



FILMATIC

Hydraulic Universal Grinders have the *exclusive* CINCINNATI Filmatic grinding wheel spindle bearings. Of multiple shoe construction, steel-backed and bronze-lined, they're self-adjusting for variations in load. Completely submerged in oil under pressure, self-renewing, wedge-shaped oil films rigidly support the spindle at all time. Write for Filmatic folder.



NOW! you'll do this job better

On the New CINCINNATI Hydraulic Universal Grinder

● No question about it. You'll get better jobs—faster—more easily—in your toolroom with the *new* CINCINNATI Hydraulic Universal Grinder.

Here's a machine that has *everything* for the toolroom!

Accuracy that makes a .0001" limit easily practical!

Faster grinding since metal removal per horsepower input is stepped up 30% by the exclusive Filmatic spindle bearing over plain bearings.

Faster set-up and handling—with precise, sensitive and positive controls.

Maintenance almost eliminated with freedom from trouble in the very heart of a grinder—the spindle bearings.

Here's a machine so accurately sensitive—so easy to handle—that the art of the skilled toolmaker is in the grinder itself.

We can't tell you all about the new Hydraulic Universal Grinding Machine in this space. All we can ask is that you write for the complete story of this master toolmaker and let us prove the contention that at last here is the toolroom grinder you've been looking for.

SAVE WITH A *New* CINCINNATI

CINCINNATI GRINDERS INCORPORATED

CINCINNATI, OHIO, U. S. A.

CINCINNATI

SYMBOL OF A DEFINITE STANDARD OF WORTH



$291

No. 1545—Complete with production type table and stand, motor pulleys and belts — but without motors.

DELTA

MANUFACTURING CO.
(INDUSTRIAL DIVISION)
602 E. VIENNA AVENUE
MILWAUKEE, WIS.

"These drill presses pulled me out of a jam!"



"Because they not only enabled me to speed up production with a small new tool investment—but I was given quick delivery on them. Yes, I got them—without the old man raising the roof on their cost."

That is what scores of production superintendents are telling us about Delta Drill Presses. They come with single or multiple spindle, floor or bench types, 11", 14" and 17" models. They give you durable precision machines at a fraction of the cost of the old type heavy machines. They are flexible—adaptable to special jobs and quick changes. They can be used for special set ups at great savings. The two-spindle 17" model here illustrated gives an

OUTSTANDING DRILL PRESS VALUE

Drilling capacity: 3/4" in cast iron. Table 29½" x 41½", surface 23½" x 36", 48½" high. Center to center between spindles, 18". Column diameter, 3½". Maximum distance chuck to table, 26". Table has 1½" oil trough, drilled and tapped at rear for ½" oil drain pipe. Quill has 5" stroke. Built-in depth stop gauge. Depth gauge on spring housing. Sealed for life ball bearings. Interchangeable spindles and heads. Shipping weight 860 lbs.

Send for DELTA Catalog

Mail coupon for latest Delta Industrial Power Tool Catalog. It contains specifications and prices of complete line of Delta Drill Presses plus details on individual parts from which you can make your own low cost assemblies.



DELTA MFG. CO. (*Industrial Division*)
602 E. Vienna Avenue, Milwaukee, Wis.

Gentlemen: Please send me your latest Delta Catalog which contains specifications and prices of your complete line of Drill Presses.

Name .....

Address .....

City ..... State .....

MORE PRECISION WORK

Companions

918 BENCH LATHE

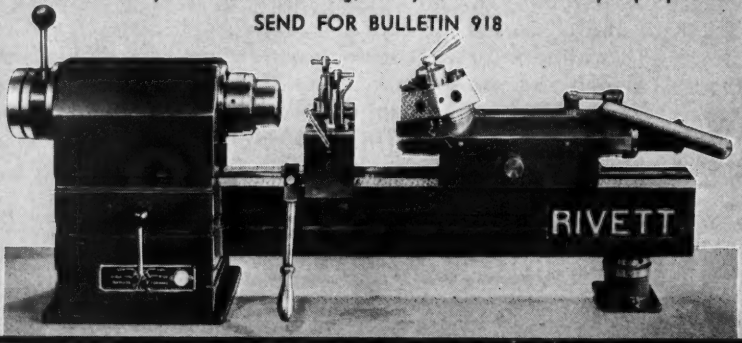
Bulletin 918 presents Rivett high precision, heavy duty bench lathe and hand screw machine. The balanced design, vibrationless performance, high spindle speeds and operating features place these machines in front for your precision tool room and production work.



918 HAND SCREW MACHINE

As with the bench lathe the hand screw machine has all-electric V-belt drive, speeds to 3750 r.p.m., 9" swing ball bearing spindle with long taper key-drive nose and draw-in or push-out type 1" capacity collets. For first operation bar work with or without automatic stock feed. For second operations, spring-temper collets and step chucks. Ball bearing, rotary chuck closer. Oil pump optional.

SEND FOR BULLETIN 918



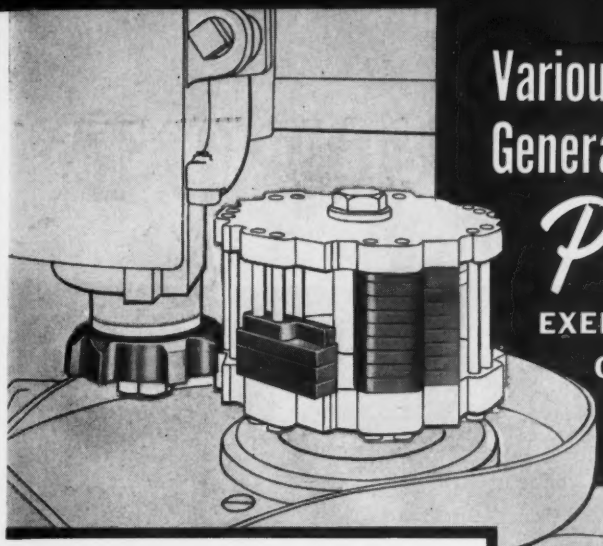
RIVETT LATHE & GRINDER INC.
BRIGHTON, BOSTON, MASS.
PIONEERS IN BENCH LATHE DEVELOPMENT

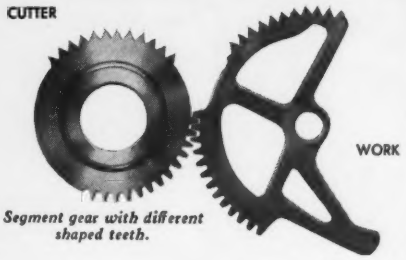




Various Precision Generation of *Profiles*

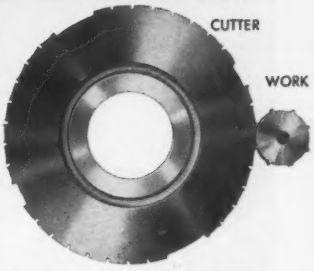
EXEMPLIFIES GEAR SHAPER VERSATILITY





Segment gear with different shaped teeth.

Cutting pawls in magazine fixture.



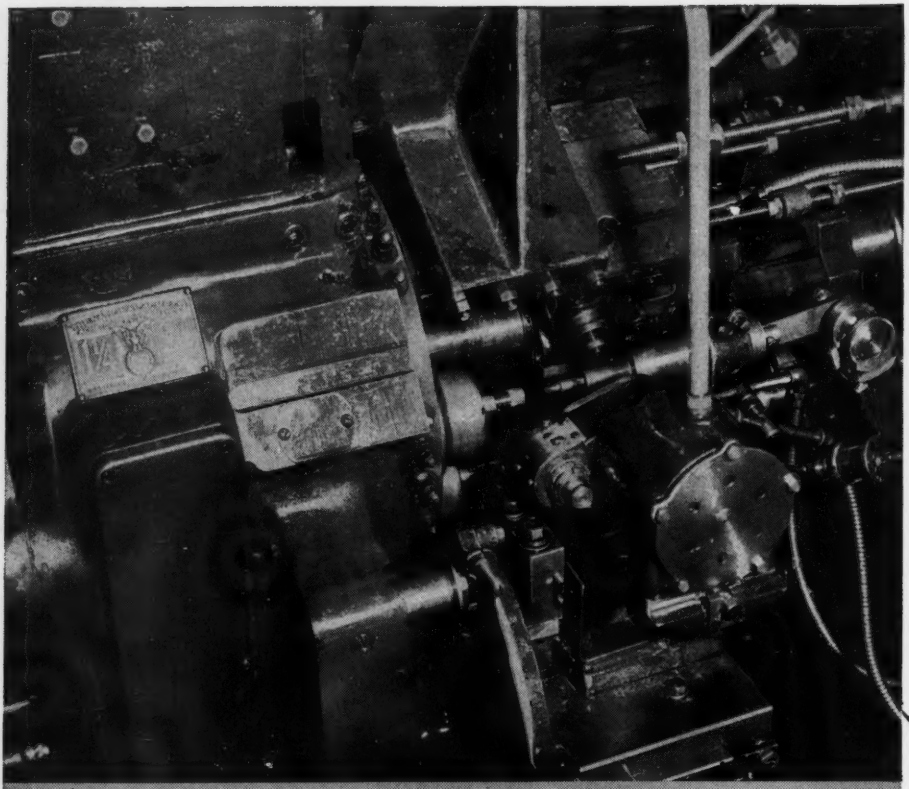
Cutting movie camera sprockets.

Close tolerance work is most economically handled on the Gear Shaper by reason of the extreme precision inherent in Fellows Cutters. These illustrations indicate only a few of the many possible applications of the Fellows Method. If you have a production run of irregular-shaped parts we would welcome the opportunity to help you cut your production costs. Send us your blueprints. There's no obligation.

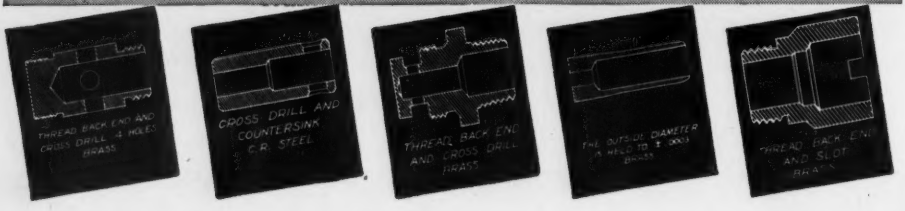
THE **FELLOWS** GEAR SHAPER COMPANY

Springfield, Vermont or 814 Fisher Building, Detroit, Michigan

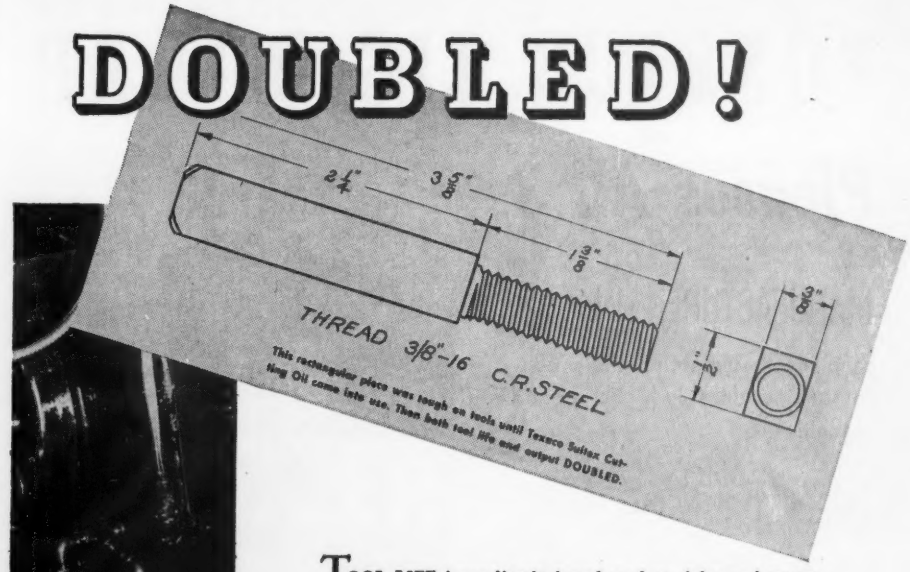
OUTPUT



SIX-SPINDLE ACME-GRIDLEY in the plant of the NORTHWEST AUTOMATIC PRODUCTS CORP., MINNEAPOLIS, MINN., where output has been doubled since beginning the use of Texaco Sultex Cutting Oil. The parts illustrated below are also the product of Northwest Automatic Products Corp. Texaco Sultex Cutting Oil in use.



DOUBLED!





TOOL LIFE immediately lengthened to 4 hours between dressings. This, in addition to the elimination of short (scrap) pieces, had the effect of DOUBLING OUTPUT. This happened after they had changed to Texaco Sultex Cutting Oil B.

Prior to this, when turning the above rectangular piece in six-spindle ACME-GRIDLEYS, the intermittent cut necessitated tool grinding every hour or two.

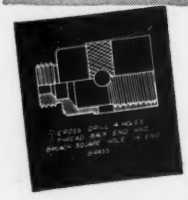
Moreover, the work pushed back into the collet, resulting in a high percentage of short pieces.

Experienced Lubrication Engineers will be glad to demonstrate that savings can be made with Texaco Sultex Cutting and Soluble Oils.

For prompt engineering service and deliveries, phone the nearest of 2279 warehouses in the U. S., or write:
The Texas Company, 135 East 42nd St., New York, N. Y.

• • •

Texaco Dealers invite you to tune in The Texaco Star Theatre—a full hour of all-star entertainment—Every Wednesday Night—Columbia Network—9:00 E.S.T., 8:00 C.S.T., 7:00 M.S.T., 6:00 P.S.T.

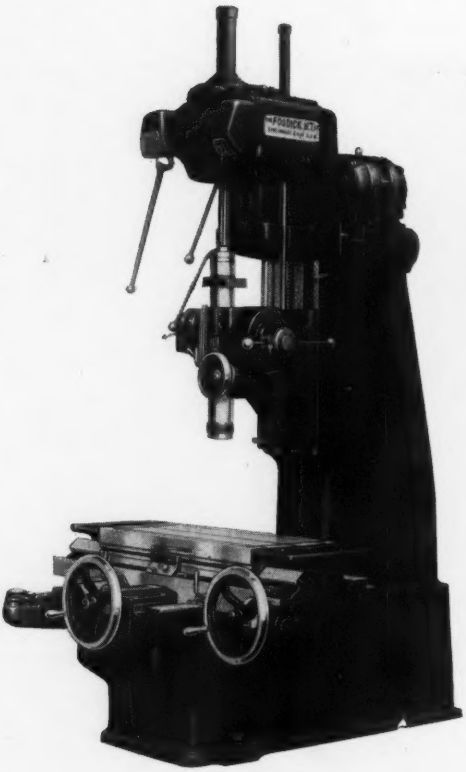


TEXACO

SULTEX CUTTING AND SOLUBLE OILS

FOSDICK JIG BORER

Pleases All 3



MANUFACTURER He knows he has built a machine that matches the precision of considerably higher priced machines.

OPERATOR He likes the convenient control handles which are placed right in front of him to prevent lost motion.

PURCHASER He owns a machine that will duplicate parts without jigs or fixtures. He can change and improve designs without the cost of retooling. That's economy!

The FOSDICK Combination Drill and Jig Borer has 12 spindle speeds from 60 to 1500 r.p.m. 9 feeds from .0025 to .020". Spindle travel 9". Working capacity 24" from spindle to table. Table 18"x36" or 22"x44".

WRITE FOR CATALOG MSJ.

FOSDICK MACHINE TOOL CO.
CINCINNATI, OHIO • U. S. A.

Cuts Sheet Metal Like a Hot Knife Cuts Butter!



The New
Thor
PORTABLE ELECTRIC
NIBBLER
SMALL · LIGHT · FAST

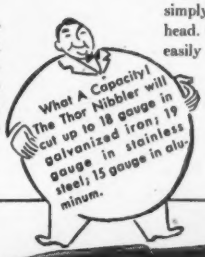


2. 5 FEET PER MINUTE is the cutting speed of the Thor Nibbler in 15 gauge aluminum; correspondingly fast cutting in other metals. It will cut to rated capacity in steel; 50% greater in aluminum and other non-ferrous metals; 1 gauge thinner in stainless steel and other hard alloys.



3. PANELS OR SHEET STOCK can be cut by the Thor Nibbler without breaking-in from the edge of the sheet. Internal shapes can be cut simply by making a 1" hole to insert the cutting head. Compact and streamlined, it can be used easily in restricted places.

1. FOR CUTTING SHEET METAL AND TUBING the New Thor Nibbler is fast, accurate and easy to handle. The compact motor housing serves as a hand grip and gives such positive guiding control that regular or irregular shapes can be cut to any line or contour It will cut on a radius as small as one inch and shapes may be cut from tubing as small as 1½" in diameter.



ALL SHEET METAL FABRICATORS can save time and money in both shop production and on-the-job installation work with the new Thor Nibbler. Its portability, speed and power cut cutting costs. Use the coupon to get full information today.



INDEPENDENT PNEUMATIC TOOL CO.
600 W. JACKSON BLVD. · CHICAGO, ILLINOIS

Thor offers more!
IN
PORTABLE ELECTRIC TOOLS

INDEPENDENT PNEUMATIC TOOL CO.
604 W. Jackson Blvd., Chicago, Ill.

Please send full information, specifications and price on the new Thor Nibbler for cutting sheet metal and tubes.

Name_____

Firm_____

Address_____

City_____ State_____



Tools Represent A Small Part Of The Production Cost . . Yet In Every Case They Determine The Productive Capacity Of The Machine . . . . . *For Generations Morse Tools Have Been Known Throughout The World For Their Outstanding Production Economy.*



FREE MACHINIST'S HANDBOOK

"Machinist's Practical Guide," a handy vest-pocket book, contains 55 pages of helpful information on Drill Grinding, Cutting Speeds, Decimal Equivalents, Lubricants for Cutting Tools, etc. Sent free. Please give name, and firm by whom you are employed.

MORSE

THERE IS A DIFFERENCE

TWIST DRILL AND MACHINE COMPANY

NEW BEDFORD, MASS., U. S. A.

NEW YORK STORE: 130 LAFAYETTE ST. - - CHICAGO STORE: 570 WEST RANDOLPH ST.



Here's a turning operation on a 24% Chromium — 12% Nickel stainless steel casting . . . difficult material to machine . . . but a Rexalloy bit enables *twice* the former turning speed . . . saves about two hours on each piece and does a lot better job . . . eliminating a former production bottle-neck!

If you have a slow spot in your plant, "speed it up" with Rexalloy . . . Crucible's cast non-ferrous cutting alloy, intermediate between high speed steel and carbides. You'll find its speeds and feeds much greater in relation to machine capacity . . . you'll like its longer life, its toughness, its resistance to abrasion.

Rexalloy is versatile . . . use it for either long or short runs . . . see how it lowers unit tool costs and reduces "downtime" between grinds.

Call Crucible's nearby Branch Office for a demonstration of Rexalloy on your machines, or write for the Rexalloy booklet TS400. Get the facts . . . without obligation!

"CALL ON CRUCIBLE"...
For Every Specialty Steel You Need!

QUALITY . . . . . *Selected*
ENGINEERING . *By Practical Men*
CO-OPERATION . *From Experienced Metallurgists*
DELIVERY . . . . *Promptly from Mills and Warehouses*

CRUCIBLE STEEL COMPANY of America

CHRYSLER BUILDING • 405 LEXINGTON AVENUE • NEW YORK CITY
BRANCHES, WAREHOUSES AND DISTRIBUTORS IN PRINCIPAL CITIES

Specialty Steels to INDUSTRY

MAKERS OF HIGH SPEED TOOL, STAINLESS, ALLOY, PRODUCTION AND SPECIAL PURPOSE STEELS

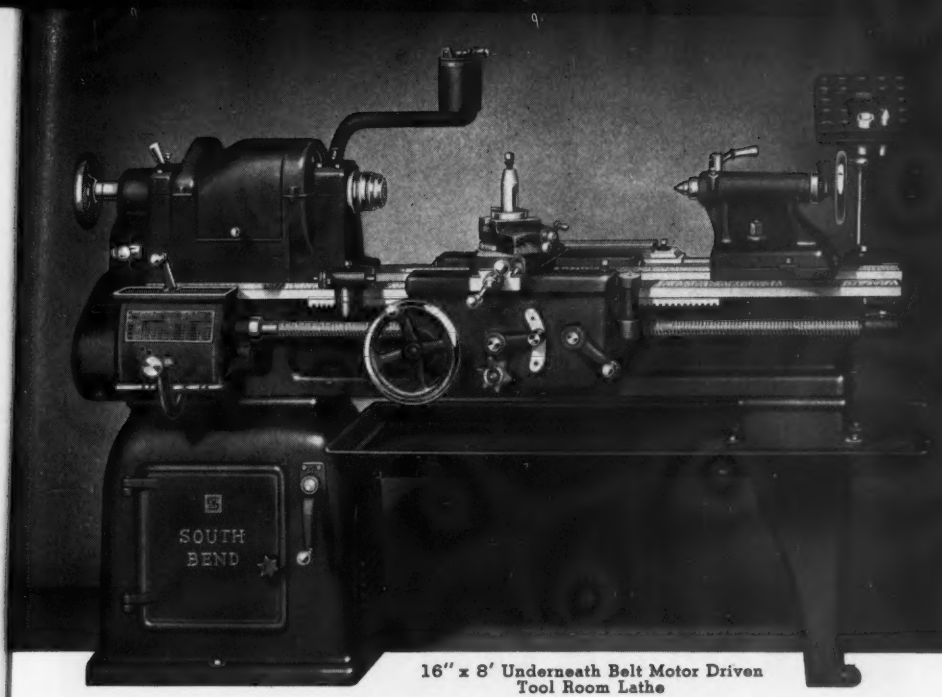


New No. 22-L
Table size: 45" x 10".
Feed range: 26" x 11" x 17".
Ram movement: 19".

RESET the cutterhead instead of the work. Mill vertically, horizontally or at any angle with a minimum of set-ups or side trips to other machines. Eliminate the errors involved in extra set-ups, increase output and cut your costs. The flexibility, ease of adjustment and ability of Van Norman Ram Type Universal Millers to handle a wide range of work will help you to get more and better work through your toolroom, pattern shop or experimental departments. Five models meet all needs from the heaviest type of work to the most sensitive. Write for Bulletins to the

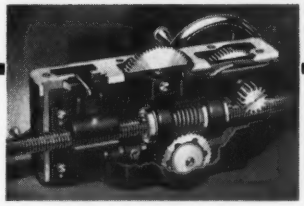
Van Norman Machine Tool Company
Springfield, Massachusetts

Van Norman Milling Machines



16" x 8' Underneath Belt Motor Driven
Tool Room Lathe

SOUTH BEND LATHES FOR PRECISION WORK



DOUBLE WALL APRON

Back view of the Double Wall Apron showing the rigid, one-piece box type construction that provides a substantial support for both ends of the gear shafts.

Gears in the apron are of steel and have a reservoir and felt wick automatic oiling system. Worm drive assures smooth operation of feeds on all classes of work.

South Bend Lathes have been giving thousands of users dependable service on the most exacting classes of precision machine work for more than thirty years. Sound design, the most expert workmanship and the best materials available are combined in South Bend Lathes to give them permanent accuracy and efficiency.

SIZES AND TYPES

Manufactured in 9", 10", 11", 13", 14½" and 16" swing, bed lengths 3' to 12', in Motor Drive and Countershaft Drive. Attachments are available for production, tool room and general machine work.

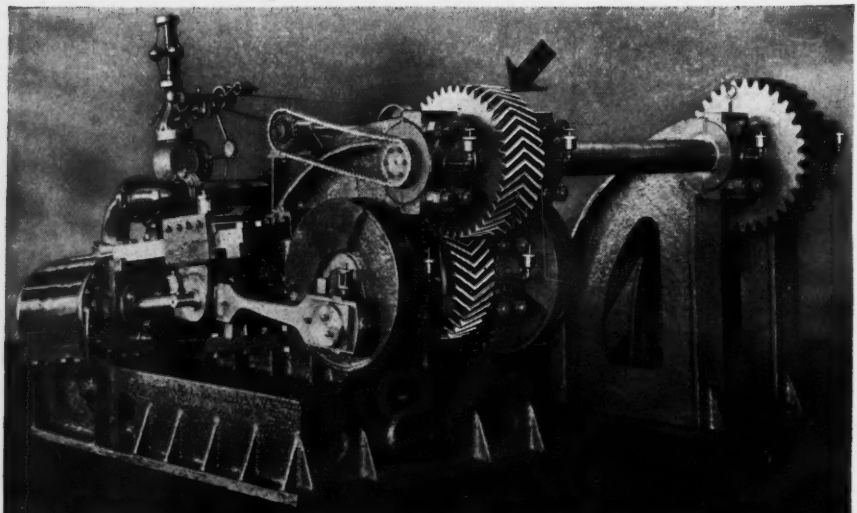
New South Bend Lathe Catalog

Write today for a copy of our new 112-page lathe catalog describing all Sizes and Types of South Bend Lathes, chucks, tools and attachments.

SOUTH BEND LATHE WORKS

LATHE BUILDERS SINCE 1906

972 E. Madison St., South Bend, Ind., U.S.A.



McKiernan-Terry Dredge Engine Uses FARREL-SYKES GEARS for Greater Strength and Durability

An important factor in the ruggedness of the McKiernan - Terry 750 H.P. cutter engine shown above is the use of Farrel-Sykes continuous tooth herringbone gears, which contribute greatly to dependable performance and long life under severe operating conditions.

Farrel - Sykes gears are proportioned for extra strength and load-carrying capacity to withstand shocks, stresses and wear. Precision generation by the famous Sykes process makes them exceptionally quiet and smooth - running. Their combined characteristics of overlap or interlacing of the teeth, gradual engagement and inclined line of pressure also contribute to smooth, quiet operation, retard wear and maintain the involute profile and correct tooth action throughout the life of the gears.

Opposed helices balance and absorb axial thrust within the gear member, preventing harmful thrust loads and resultant stresses on other parts of the machinery.

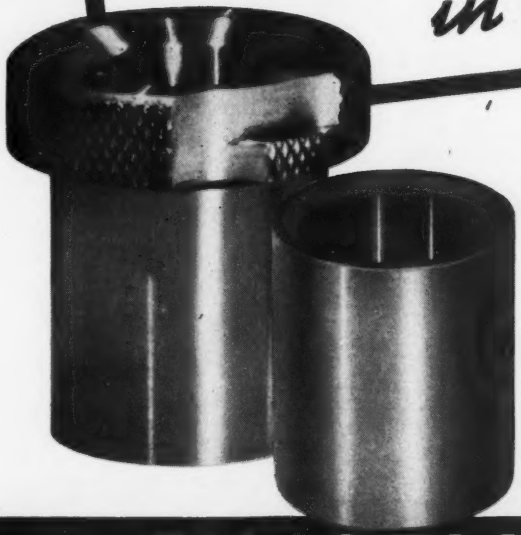
We have exceptional facilities at our Buffalo plant for making gears, gear units and flexible couplings for any application and in any capacity. Our engineers offer experienced counsel and expert assistance in your gear problems. For further information, descriptive catalogs and engineering data please write to the address below.

FARREL SYKES GEARS

FARREL-BIRMINGHAM COMPANY, Inc.
381 VULCAN STREET - - - - - BUFFALO, N. Y.
The Gear with a Backbone

BUSHINGS

Shipment within
24 HOURS
OVER 250,000
in Stock



Send for
CATALOG
No. 118

EX-CELL-O CORPORATION
DETROIT, MICH.

EX-CELL-O

PRECISION
MACHINES
AND TOOLS

Surface Broaching...
COVERS A WIDE VARIETY OF FIELDS



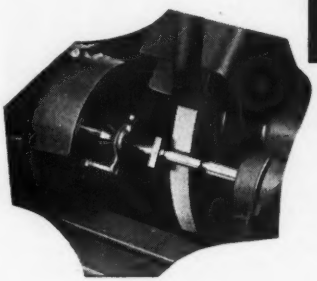
IN many industries there are unexpected uses for surface broaching. Wherever duplicate parts are machined in large quantities it will pay to investigate surface broaching for removing excess metal and bringing to accurate size in one operation. We will be glad to give you the benefit of our long experience in the study of your problem.

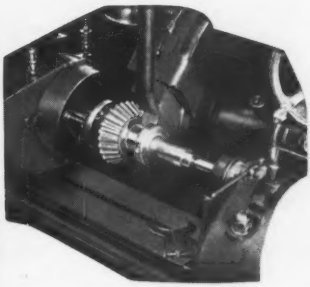
Broaching plier parts to size is a good example of an unusual application of this up-to-date machining method.

THE FOOTE-BURT COMPANY
CLEVELAND, OHIO
Detroit Office: 4-151 General Motors Bldg.
Chicago Office: 565 Washington Blvd.

FOOTBURT *Surface* BROACHING

OUT OF MANY

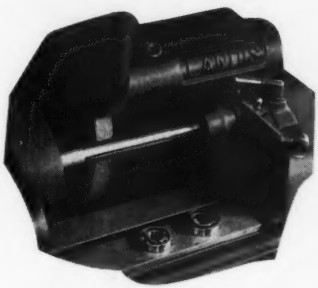


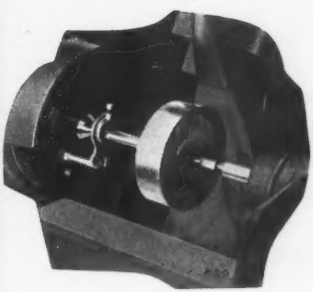


Ladies' full-fashioned silk hosiery is not ordinarily associated with grinding machines. Nevertheless, a Landis 10" x 48" Type C Plain Hydraulic was recently installed by a leading producer of the equipment used for the manufacture of hosiery of this kind.

Although a high production unit, this Landis Type C has proved versatile too. It is being used for a wide variety of operations, five of which are shown. Grinding a roller stud is shown by view D-68, an examining form shaft by view D-70, a steel bevel pinion by D-67, a chilled rim roller by D-69 and a narrowing spindle by D-71. Good production is maintained and the limit of accuracy on most of the parts is .0003".

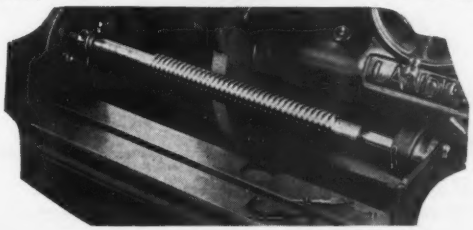
The manufacturers of equipment of many kinds will find it to their advantage to investigate the possibilities of modern Landis grinders. They may, like this textile machine builder, find their investigation a profitable one.





LANDIS TOOL COMPANY

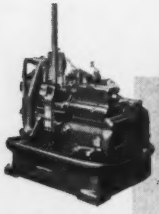
WAYNESBORO, PENNSYLVANIA.



No. 300

For High Production and Low Costs!

Barber-Colman Offers



Type S Hobbing Machine

Hobbing Machines—Six standard sizes and types; ranging in capacity from 1" diameter by 1/2" face, to 14" diameter by 14" face; representing latest developments in hobbing.

Hobs—Ground hobs for highest accuracy, finest finish, greatest value. Unground hobs for ordinary limits, lowest purchase price.

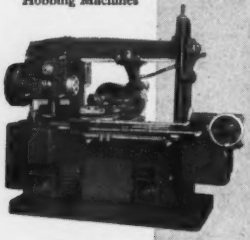
Milling Cutters and Reamers—Produced by same expert engineers, skilled workmen and complete facilities that have made Barber-Colman Hobs pre-eminent. Cutters in standard sizes and types, certain distinctive B-C designs. Reamers have exclusive features and advantages for accuracy, fine finish, high production, and economy.

Sharpening Machines—For Hobs, and Formed Milling Cutters, of any brand: Automatic Sharpening Machines in two sizes. For B-C Reamers, an extremely accurate patented Sharpening Machine. For Reamers, Cutters and Hobs of all makes; the manual-feed Combination Sharpening Machine provides new high accuracy, convenience, and broad usefulness.

Engineering Service—Specialists in design, construction and most effective use of all B-C products are always available for consultation and complete cooperation. Accurate, dependable . . . Barber-Colman products increase net profits for their purchasers. Investigate.



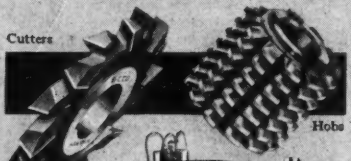
No. 3 Hobbing Machines



Type A Hobbing Machine

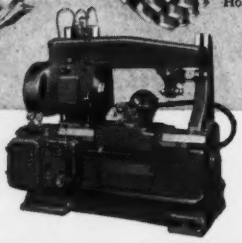


Type T Hobbing Machine



Cutters

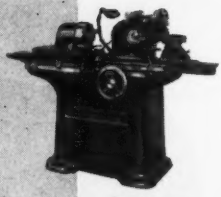
Hobs



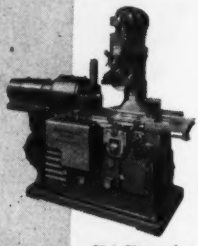
Type D Hobbing Machine



Type V Hobbing Machine



Combination Sharpening Machine



Hob Sharpening Machines

BARBER B-C COLMAN PRODUCTS: HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, MILLING CUTTERS, SPECIAL TOOLS

BARBER-COLMAN COMPANY

General Offices and Plant ROCKFORD, ILLINOIS, U. S. A.

MACHINE OF THE MONTH

EPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK

AUTOMATICALLY-LOADED *Lo-Swing* IMP PROVIDES HIGH PRODUCTION ON BICYCLE PART

Problem: To provide completely automatic equipment to remove welding flash and to radius both flanges of bicycle hub on high production basis.

Solution: Since the work was light and high speeds desirable, a standard Lo-Swing IMP was chosen for this job. It is equipped with a Seneca Falls automatic loader which requires no operator-attention beyond merely keeping the hopper loaded. Mechanical fingers place the work between centers. A stub center on the tailstock pushes the piece forward to locating position on an expanding arbor, which in turn grips and drives the piece.

Three tools are mounted on a front cross slide. The center tool removes the welding flash with a skiving cut. The two outside forming tools radius the flanges. Since there is a slight variation in the length of the hubs due to the center weld, means are provided to properly position the rear form tool to correspond to the particular piece being turned. The rear tool is mounted so as to allow sidewise movement, and a locating arm—fixed to the tailstock quill—positions the tool laterally as the center moves into position.

Production on this job is 600 per hour using cemented carbide form tools and a high-speed steel skiving tool running at a spindle speed of 660 R.P.M.

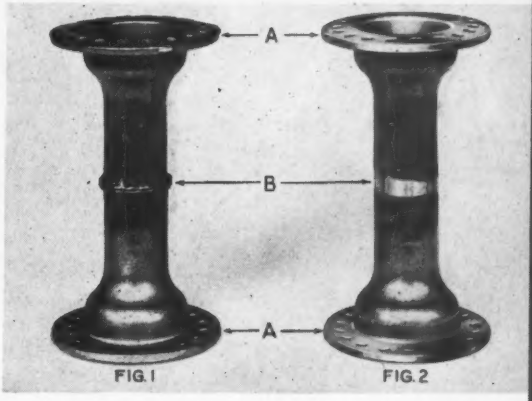


FIG. 1 FIG. 2

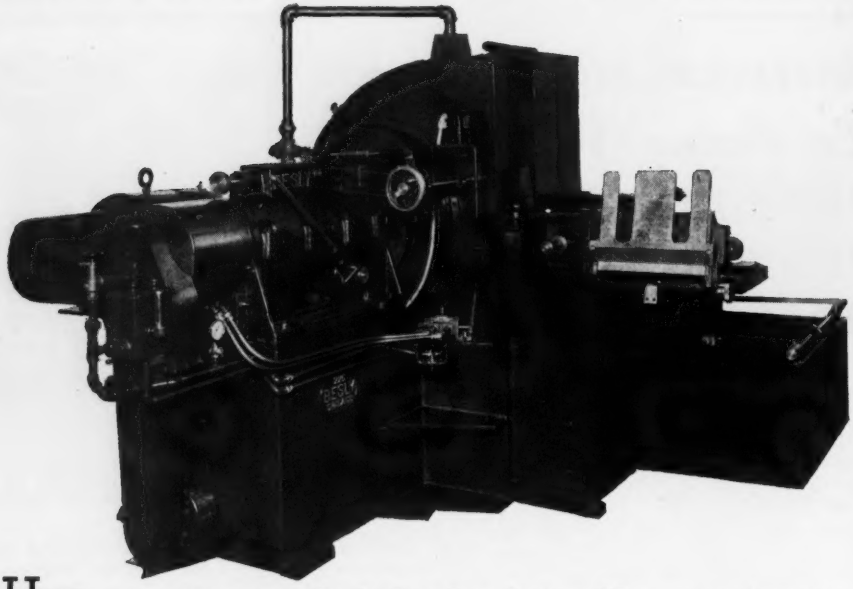
Fig. 1 shows work as it comes to the machine. Note welding flash (B) and sharp, uneven flanges (A & B). Fig. 2 shows finished piece with flanges rounded and flash removed.

Standard Lo-Swing IMP Lathe before being equipped with Seneca Falls Automatic Loader.



LATHE NEWS from SENECA FALLS

Versatile IS THE WORD . . .



HERE is one of the many Besly Grinders designed by our engineering staff for a specific purpose. • Several of these Special Besly Grinders are at work daily in the plants of one of the well known tobacco manufacturers sharpening knives illustrated at the rate of 60 per hour. A Quick Clamping Indexing Type Fixture enables operator to chuck one knife while another is being ground. Feed of wheel and travel of table are hydraulically controlled.



Write for your copy of Booklet on Besly Titan Steelbacs.

The Besly Titan Steelbac Abrasive Wheel (Ring Type) with perforations plus plenty of coolant insures a fast grind with no danger of burning. • If you are interested in flat surfacing, investigate the possibilities of Besly Grinding. On work within its sphere it usually means faster grinding, lower abrasive costs and often a better class of work. Put your flat surface grinding problems up to the specialist in the field.

CHARLES H. BESLY AND COMPANY

118-124 NORTH CLINTON STREET * CHICAGO, ILLINOIS



When The Armistice Is Signed

. . . and the flame and crash of battle are replaced by the tolling of bells, the shrieking of whistles, the roar of happy crowds . . . the question "What of tomorrow?" will again occupy men's minds. Once more, men will plan to adopt machines engineered-for-greater-human benefits, whose use improves social and economic conditions by raising the standard of living. The Monarch Machine Tool Co., Sidney, Ohio, U. S. A.

Monarch Lathes

Bridgeport



TURRET MILLING MACHINE

Flexibility
Rigidity
Unparalleled
Range

•

AN outstanding produc weighing 1600 lbs. with un usual range for large too and fixture work yet ex tremely sensitive for fin milling on molding dies.

•

Also, high speed milling at tachments for all makes o milling machines.

•

Write for further detail

•

BRIDGEPORT MACHINES, INC

52 REMER STREET · BRIDGEPORT, CONN



Index



WILCO No. 706

Low in first cost and low in operating and maintenance expense . . . fast in operation . . . ruggedly built for long service—the WILCO is an odds-on favorite with maintenance departments. Capacity 1″ to 6″ in one die-head without change of dies except for change of pitch. Also made in 1″ to 4″ size—No. 704. Write for List No. 10-A describing the WILCO Line in detail.

THE OSTER MANUFACTURING COMPANY

Sales Office: 2081 East 61st Street, Cleveland, Ohio
Factories: Erie, Penna., and Cleveland, Ohio
New York City Office, 30 Church St.

Threading Headquarters Since 1893

SHELDON

Back Geared Screw Cutting
PRECISION LATHES



SHELDON LATHES though low in price are quality machine tools in every detail . . . in design, materials, workmanship and in features.

Made in three sizes (10", 11" or 12" swing) the SHELDON Lathe is just the lathe for your experimental department, repair department or tool room. It is also ideally suited for the manufacturing departments . . . fitted with special tools it is a money maker on second operation work. It can be furnished in many styles and combinations.

Spindles are hardened and ground, inside and out -- even the spindle nose thread is ground. Quick change or Semi-quick Change Gear Boxes. Plain Aprons or Worm Feed Aprons with power Cross Feed
All popular drives.

See the SHELDON
before you buy

Write for Catalog

SHELDON MACHINE CO
1626 N. KILBOURN AVENUE
CHICAGO, U. S. A.

THIS
MILLING MACHINE HAD TO BE UNUSUAL



When a company enters a new field, it's always a tough set-up, and it must have something unusual to offer.

Four years ago, the U. S. Tool Company, Inc., decided to manufacture a light, high speed, production milling machine—The Multi-Miller—and one main factor was of absolute importance: The machine had to be outstanding. That the Multi-Miller is such a machine is proved by the original installations, followed by re-orders—and the new installations being made in constantly increasing numbers by manufacturers of typewriters, small arms, aircraft, business machines, sewing machines, cameras, electrical appliances, instruments, etc.

Send for Bulletin SM-36 for the complete story of the Multi-Miller.

MAKERS OF
U. S. MULTI-MILLERS
U. S. MULTI-SLIDE MACHINES
U. S. AUTOMATIC PRESSROOM EQUIPMENT—U. S. COMPOUND WHEEL TRUING ATTACHMENT
U. S. DIE SETS

U. S. TOOL COMPANY, INC.
AMPERE (EAST ORANGE) N. J., U. S. A.

PRODUCTS

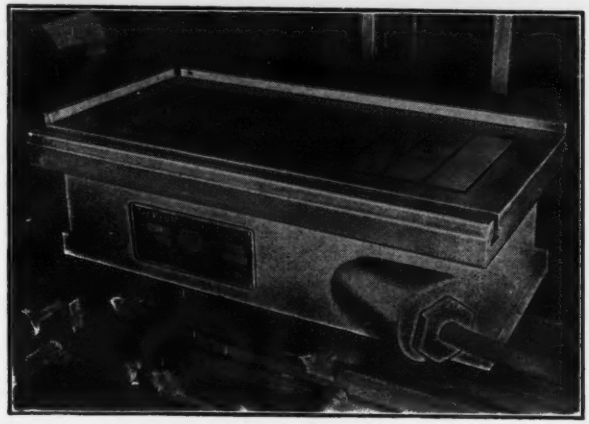
KAR TIME SAVING DEVICES

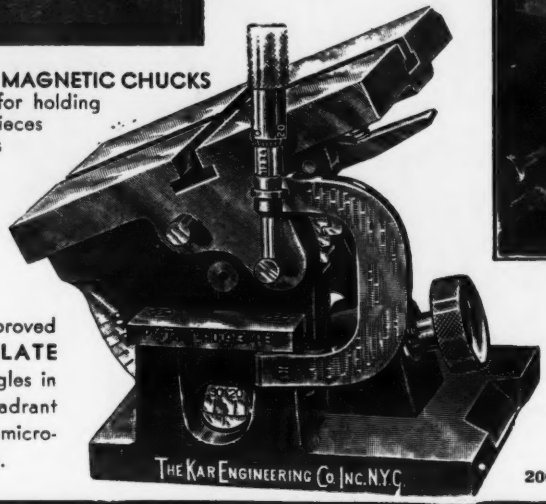
Increase PRODUCTION *decrease* COST



ACCESSORIES for MAGNETIC CHUCKS
Karnetic Parallels for holding irregular shaped pieces without special jigs and fixtures.

WRITE FOR LITERATURE





The new and improved **SINE ANGLE PLATE** measures exact angles in any part of the quadrant —only a two inch micrometer is necessary.

DEMAGNETIZE on the same chuck that held the work during a machine operation. No separate demagnetizer is necessary. A new and patented feature found only in **THE KAR DUO MAGNETIC CHUCK.**

ESTABLISHED 1916

The KAR Engineering Co., Inc.
200 HUDSON STREET **NEW YORK CITY**

Step Up Production The Oliver Way

Maximum machine production is dependent upon efficient Tool performance.

Efficient Tool Performance is dependent on accurate, Correct Tool Regrinding methods, (The Oliver Method).

* * *

Oliver of Adrian has made a study of Tool Grinding, for many years, and has developed a complete line of grinders for your Tool room—machines that will reduce your Tool Costs—increase output—give you more accurate work—less scrap and MAXIMUM MACHINE PERFORMANCE.

"Don't neglect your tool room."

* * *

Send for literature on any of these machines.

THE OLIVER LINE:

Twist Drill Grinders
Face Mill Grinders
Tool and Cutter Grinders
Tap Grinders—Point Thinners
Die Making Machines.



Cut illustrates the new 510 Oliver automatic twist drill pointer—for drills ¼ to 3"—Variable point angles—Variable clearances.

OLIVER INSTRUMENT COMPANY
1430 EAST MAUMEE STREET .:. ADRIAN, MICHIGAN

MY SON AL AND THIS UNISHEAR STARTED WORK TOGETHER—10 YEARS AGO!



Stanley "Mighty Midget" Unishear, capacity 18 ga. hot rolled steel, $54.00. Other portable and stationary Unishears cut up to 1/4" boiler plate.

"Since 1929, Our 'Mighty Midget' Unishear Has Saved Us Hundreds Of Dollars!" Reports Foreman Fred Rushworth, James Hill Mfg. Co.

"WE handle all kinds of sheet metal," says Mr. Rushworth. "There are plenty of special jobs and plenty of straight fast production going through our plant all the time. I can remember, before we got our Unishear, how the men used to tie rags around their hands so they could stand to use snips all day.

"We use our Unishear for cutting outlets, curves and special shapes of all kinds. When one man puts it down, another grabs it. Believe me, it's never idle long."

This ten year record (and still going strong!) isn't unusual for a Unishear. Figure the Mighty Midget's $54.00 price over the number of years it will serve you – and you can't afford to be without one! Ask your Stanley distributor for a demonstration, or write for literature. Stanley Electric Tool Div., The Stanley Works, 137 Elm Street, New Britain, Connecticut.

STANLEY UNISHEARS

THE ELECTRICALLY DRIVEN HAND SHEARS

Safety + Efficiency + Economy = YALE CHAIN HOISTS



Take greater safety — greater economy — greater efficiency. Put them into a chain hoist, and what do you have? Answer — the best chain hoist on the market . . . YALE!

The first choice of industry 'round the world, the Yale spur geared hoist offers a higher mechanical efficiency return than that of any other hoist—85%! That means faster, more economical operation on ***any*** job. And for greater safety there is another feature that is EXCLUSIVE with Yale—the Steel Safety Hook. Under extreme overload this hook ***opens slowly without fracture.*** It's a safety gauge that never fails!

But these are just two of the many features that can be found on Yale Hoists. For complete details get our catalog from your local Yale distributor. It contains full information on the entire Yale line.

Capacities — 300 lbs. to 40 tons

Send for this catalog today.

THE YALE & TOWNE MFG. CO.

PHILADELPHIA DIVISION, PHILADELPHIA, PA., U.S.A.

In Canada, St. Catherines, Ont.

SMALL MULTIPLE SPINDLE TAPPING AND DRILLING HEADS

Ettco - Emrick

"EVERY PART IN STOCK EXCEPT THE HOLES"



A STANDARDIZED SYSTEM

ETTCO MULTIPLE HEADS are manufactured. Hundreds of cases — thousands of gears are in stock. Delivery service is at times within 24 hours.

They are made up of interchangeable units. The ultimate cost of the heads is the lowest of any made.

Your manufacturing is 100 to 500% faster and a better job.

We'll intelligently engineer your job and show you how to tie the head to fast work holders for the ultimate in production and accuracy.

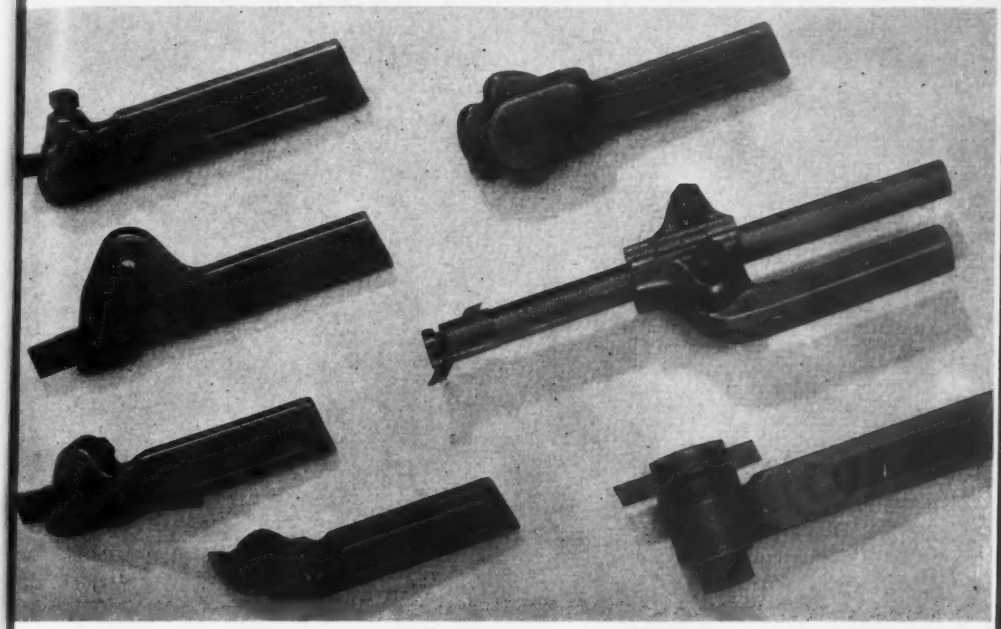
Let us have a drawing or part for quotation.

ETTCO TOOL CO.

594 JOHNSON AVE. BROOKLYN, N. Y.

CHICAGO DETROIT CINCINNATI

WILLIAMS' IMPROVED



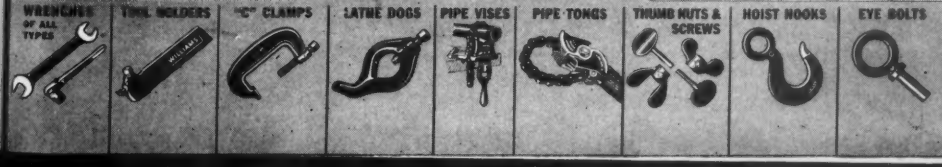
LINE OF TOOL HOLDERS

You will find a Williams' Holder for every regular operation on Lathe, Planer and Shaper—Turning, Boring, Threading, Knurling, Cutting-Off and Side work. Many of these holders have design and utility features which are exclusively Williams'. All represent the maximum in quality and performance. No matter what the operation, Williams' Holders assure a solid cutter seat and a chatter-proof, clean-cutting tool.

In addition to the various types illustrated above, Williams' improved Holders are available in all other patterns popularly used, as well as Carbide Turning Tools.

Your industrial distributor can show you the full line of Williams' Holders, or a copy of Williams' Tool Holder booklet will be mailed upon request.

J. H. WILLIAMS & CO. HEADQUARTERS FOR 225 LAFAYETTE ST., NEW YORK





BROWN & SHARPE TOOLS

ON THE JOB EVERY DAY!



BAY STATE RESINOID BONDED WHEELS

- SNAGGING WHEELS
- DISC GRINDING WHEELS
- CUT-OFF WHEELS
- TOOL WHEELS
- SEGMENTS
- MOUNTED POINTS
- HONING AND SUPERFINISHING STONES

YOU CAN DEPEND ON THEM

SEND FOR BIG ILLUSTRATED FOLDER NOW READY



BAY STATE ABRASIVE PRODUCTS CO.
WESTBORO, MASSACHUSETTS

ABRASIVE BAY STATE PRODUCTS CO.



All types of bushings are being cut here in lots of 1 to 300. Although the WICACO Oil Groover is used only a few hours a day, it is so much faster that it has paid for itself in less than 2 years—a 50% return on the investment.

WICACO
OIL GROOVER for SHORT RUNS or HIGH PRODUCTION

● The Wicaco Continuous Oil Groover is essentially a high production machine, but its efficiency enables it to pay its way even on odd lot runs.

● Features of the Wicaco Oil Groover:

1. Upright construction of spindle and stationary chuck permits continuous loading and unloading the work without stopping the machine.
2. Revolving spindle and stationary chuck permit grooving of large, irregular pieces.
3. Automatic operating features enable operator to produce 500 or more pieces per hour.

72nd Anniversary • Established 1868

Write for complete details

The WICACO MACHINE Corp.

WAYNE JUNCTION • PHILADELPHIA, PA.

Kellerflex cleans aircraft engine heads like these 24 hours a day, in the hands of 3 operators working 8 hours each.



3 men . . . and a KELLERFLEX

WHAT better test could there be of Kellerflex quality and stamina than is under way right now in aircraft plants? Three men rotate 8-hour shifts—but the machine goes on without a stop. Yet there is no overheating, no trouble, and it continues to clean these fins efficiently and quickly.

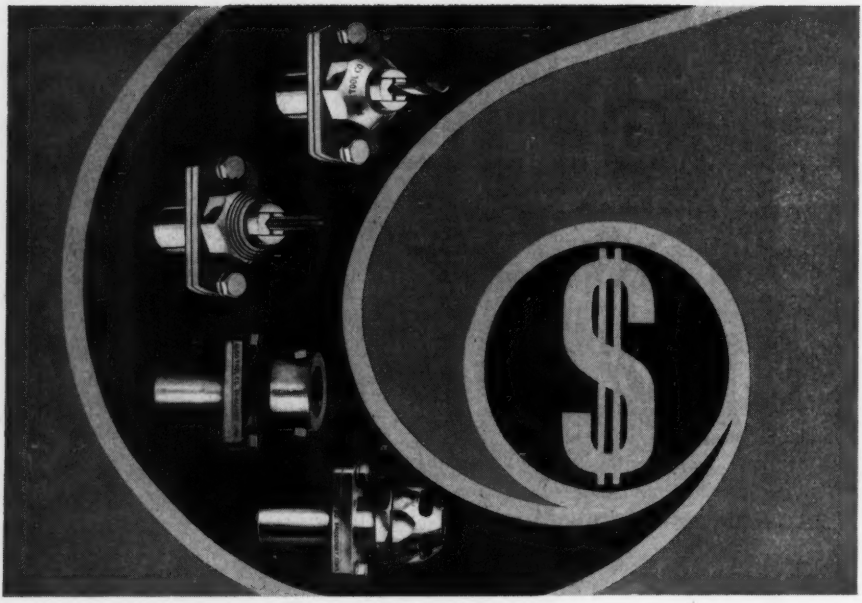
Kellerflex Flexible Shaft Equipment is precision-built to Pratt & Whitney standards. It delivers long, useful, trouble-free service. It replaces "muscle" finishing, and does a far better job.

There are thousands of uses for Kellerflex machines and their many attachments and accessories. New applications are found daily that speed up production and ease the burden of busy plants. For complete information ask Pratt & Whitney—headquarters for the finest of flexible shaft equipment.

PRATT & WHITNEY

Division Niles-Bement-Pond Co. **Hartford, Connecticut**

Kellerflex Sales Department



Cash in on Concentricity

THAT'S what you can do if you equip your screw machines—old or new—with ALCO Tools. Drilling, tapping, threading—it's all the same. The exclusive floating feature, embodied in all ALCO Tools, makes adjustment simple and positive and insures *absolute concentricity.* Set-up time is saved. Expensive rejections, on account of imperfect holes or defective threads, are reduced to a minimum. When these tools are used, even inspection is frequently unnecessary. You can speed up your production and improve the quality of your output. And don't forget that, with ALCO Drill Chucks and ALCO Tap Holders, since *no bushings are required,* you can cure your bushing headaches and wipe out your heavy bushing inventory.

Start the New Year right. Reduce your production costs. Improve your finished product. How? Write today for detailed information or for a call from our representative in your locality. Alco Tool Company, 835 Housatonic Avenue, Bridgeport, Connecticut, U. S. A.

ALCO EFFICIENT TOOLS



A 20-TON ROLL GETS ITS FACE LIFTED!

WITH most rolled products, the call today is for high precision. Finishes must be as near perfection as possible. But whether it's a thousand foot strip of automobile sheet steel or a piece of thinnest gold foil, the finish on the product can be no better than the finish on the roll which rolls it out.

That is why the finishing of a roll is so delicate and important a business. And it explains why The Carborundum Company has spent a long time in developing the right grinding wheels and procedures for every roll grinding job. Be it a twenty-ton roll for rolling billets, or a twenty-pound roll for jewelers metals, Carborundum engineers can quickly specify the grinding wheels and methods which will give you the best possible finish in the least time . . . and at lowest cost!

If you are confronted with roll grinding problems, or grinding problems of any other kind, we suggest that you let the vast experience and technological resources of The Carborundum Company point the way to a solution that will bring you greater precision, higher production and reduced grinding costs.

FOR PRECISION RESULTS

use

CARBORUNDUM

ABRASIVE PRODUCTS

THE CARBORUNDUM COMPANY

REG. U. S. PAT. OFF.

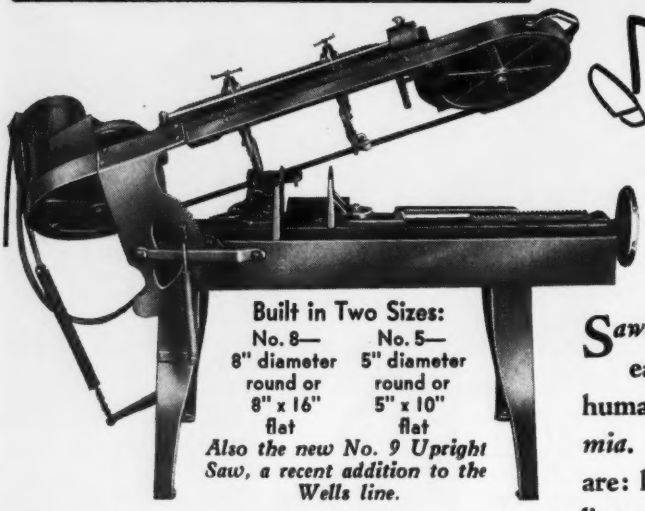
Niagara Falls, N. Y.

Sales Offices and Warehouses in New York, Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh, Cincinnati, Grand Rapids

(Carborundum is a registered trade-mark of The Carborundum Company)

Has your plant SAWITIS?





Built in Two Sizes:

No. 8—	No. 5—
8" diameter round or 8" x 16" flat	5" diameter round or 5" x 10" flat

Also the new No. 9 Upright Saw, a recent addition to the Wells line.

Sawitis is a plant disease similar to the human ailment: *Anaemia.* The symptoms are: loss of production line "pep," frequent bottle-necks due to cut-off room breakdowns, and high stock mortality rates because of inaccurate metal cutting. One or all of these symptoms will cause high blood pressure in the cost department. The recommended remedy is Wells Saws. Their fast, accurate cutting and dependable service backed by years of saw-building experience will cure the most tenacious case of *Sawitis.* Sold through leading Mill Supply Dealers—or write direct.

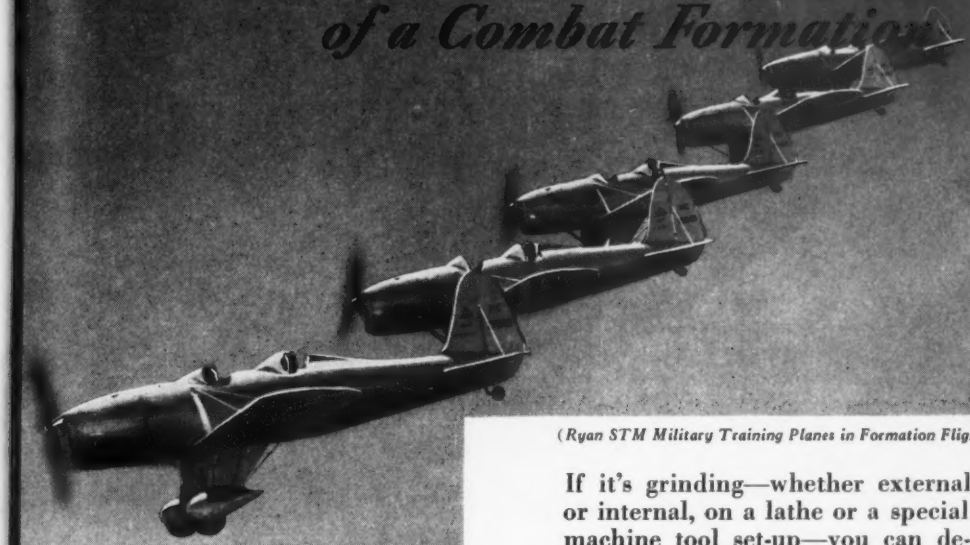
Write for list of users.

WELLS MFG. CORP.

WELLS METAL CUTTING BAND SAWS

THREE RIVERS, MICH.

All the Precision of a Combat Formation



(Ryan STM Military Training Planes in Formation Flight)

If it's grinding—whether external or internal, on a lathe or a special machine tool set-up—you can depend on getting accuracy to a tenth (.0001") with a Dumore. Call the Dumore distributor nearest you . . . he'll recommend the right one of many Dumore models — the exact model to fit your needs. Through him you are offered the advantages of over a quarter-century of specialized precision grinder manufacturing experience.

THE DUMORE COMPANY
DEPT. 180-A, RACINE, WISCONSIN



Dumore
No. 12
"Chief"

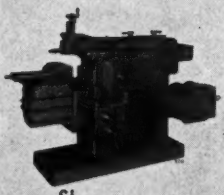
Only DUMORE Gives You All of These

- Lightweight for easy portability.
- 42,500 r.p.m. . . . without vibration.
- Wide selection of quick-change quills.
- 15 models from which to select.
- 25 years precision manufacturing experience.
- Top ranking distributors conveniently located.

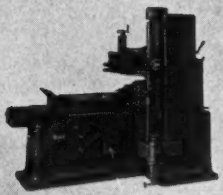
Dumore PRECISION *Grinders*

Reciprocating
Hy-Draulic
Machine Tools

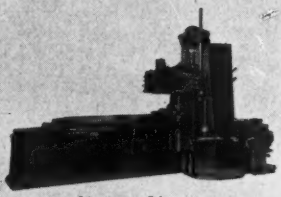
Hy-Draulic Reciprocating Machine Tools, illustrated at right, possess the notable advantages of hydraulic drives and hydraulic feeds . . . Uniform Cutting Pressure, Stepless Speeds and Feeds, High Return Ratios, Standard Motor Drive directly connected to hydraulic unit. This results in high production, accuracy, fine finish, long tool-life, and over-all economy. Made in sizes which meet all usual requirements of manufacturing, tool work, and maintenance; Hy-Draulic Reciprocating Machine Tools are leaders in commercial work, well and favorably known in government shops everywhere. Complete information about Hy-Draulic Reciprocating Machine Tools will be sent to interested executives promptly on request.



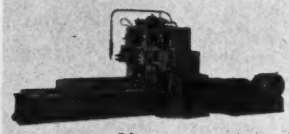
Shapers



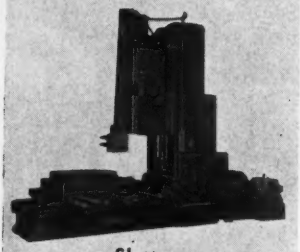
Openside Shapers



Shaper-Planers



Planers



Slotters



Economy
LATHES

Accuracy, convenience, power and durability make Economy Lathes outstanding *values* for a wide variety of work in all kinds of commercial service . . . in high-production manufacturing, tool rooms, maintenance shops, apprentice schools; in fact *everywhere* a good engine lathe is required. These *big-value* lathes are made in Geared Head and Cone Head Types, in 12", 14" and 16" sizes. See your Economy Lathe dealer, or write, today, for circular describing these money-saving lathes.

ROCKFORD MACHINE TOOL CO.
ROCKFORD, ILLINOIS, U.S.A.



Atlas F-SERIES 10" LATHES

Power Cross Feed Standard Equipment

Whatever the Job . . . These Features Help You Do It Easier and Better!

You buy a lathe with definite things in mind: Precision workmanship—simple, convenient operation and complete versatility—dependable, long-life construction. And price is usually important. In all these respects you'll find many of America's leading tool rooms and shops advising—"Get the modern Atlas." Here are some of the reasons why:

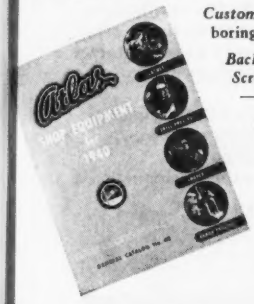
Power Cross Feed standard equipment. Atlas is the only low-cost precision lathe giving you this feature that saves much laborious work on facing operations.

Precision-Ground Bed—first essential of a precision lathe. All six Atlas bearing surfaces are aligned to within .001 in all planes.

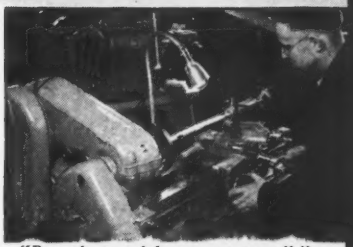
Custom-Bored Spindle Bearings positively aligned by boring *after the headstock has been fitted to the bed.*

Backgeared Power—Complete V-Belt Drive—Wide Screw-Cutting Range—Quick-Change Countershafts —Rugged Zamak Alloy Parts—at no extra cost.

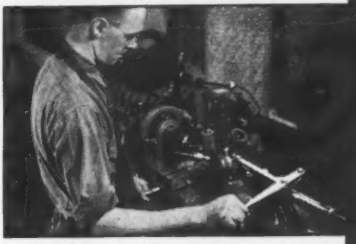
Sensible Prices. The 10" horizontal countershaft model above is $104.75 complete as shown less motor—with vertical (attached) countershaft only $99.75.



Whatever the job, you can do it easier and better with an Atlas Lathe. See them at your dealer's and send the coupon below for your 1940 Catalog.



"Rugged, powerful, accurate, versatile" say shop men everywhere.



"Ideal for small part precision work."

ATLAS PRESS COMPANY

146 N. Pitcher St., Kalamazoo, Mich.

NEW YORK 30 W. 42nd St. | CHICAGO 35 E. Wacker at Wabash | PHILADELPHIA 113 N. Third St.

ATLAS PRESS CO.
146 N. Pitcher St., Kalamazoo, Mich.

Please send me your 1940 Catalog on ☐ 10" Metal Lathes ☐ 6" Metal Lathes ☐ 7" Metal Shaper ☐ Drill Presses ☐ Arbor Presses ☐ Motors and Grinders ☐ Drill Grinding Attachment.

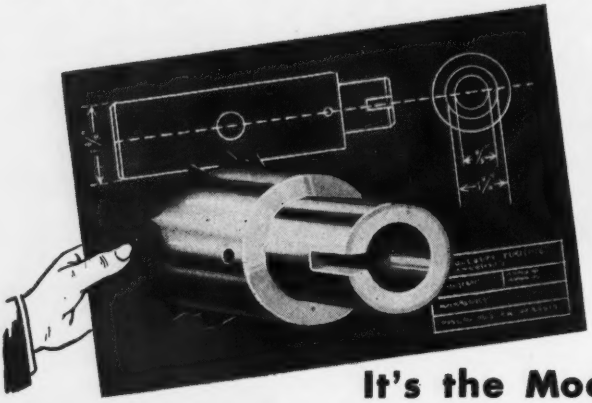
Name .....

Company .....

Address .....

City and State .....

When Your Specifications Demand Straight, Round Holes



Use SUNNEN HONING!

It's the Modern Method that Positively Corrects Errors of Taper and Out-of-Roundness to .0001" Limits!

THE Sunnen Precision Honing Machine will produce supersmooth surface finishes and correct errors of previous machining to a .0001" limit of accuracy *in the same operation.*

Take for example the nitrided steel Diesel Engine Fuel Injector Cylinder shown above. The manufacturers of these important units use Sunnen Precision Honing Machines because, in addition to their simplicity of operation, they provide the only practical, low cost, production method for securing the extreme accuracy necessary for this class of work.

A Low Cost Machine with Guaranteed Accuracy
Easy to Operate and Control.
Effects Production Efficiencies.



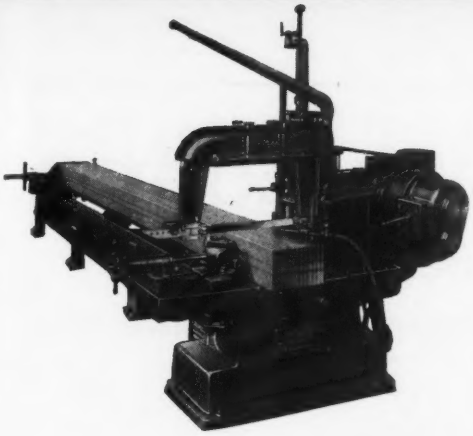
Hundreds of manufacturers of such parts as gauges, drill jig bushings, bearing races, automatic machinery, hydraulic cylinders, clevises, gears, valves, gyroscopes, instruments, pump parts, etc., are now using Sunnen Precision Honing Machines to correct errors, maintain alignment and finish their holes to extreme limits of accuracy and smoothness.

The Sunnen Precision Honing Machine is ideally suited for assembly operations, repair and salvage work, short run production, tool room and experimental work and for the job shop.

Write today for new 8-page bulletin giving complete information.

SUNNEN PRODUCTS CO.
8003 Manchester Avenue St. Louis, Missouri

SUNNEN
Sunnen Model "MA" 4-Speed
PRECISION HONING MACHINE







"Saw More"

HEAVY DUTY—HIGH SPEED METAL CUTTING MACHINES

"Saw More" 4-Speed Gear Box Transmission

With 12 foot automatic bar feed. Motor Driven.

MANUFACTURED IN
2 Sizes — 6" x 6" and 10" x 10". Either with or without automatic bar feed.

"Saw More" 3-Speed Silent "V" Belt Transmission

Without automatic bar feed.

MANUFACTURED IN
2 Sizes — 6" x 6" and 10" x 10". Either with or without automatic bar feed.

"Saw More" Swiveled

All "Saw More" Machines

swivel on base to 45 degree for angle cutting.

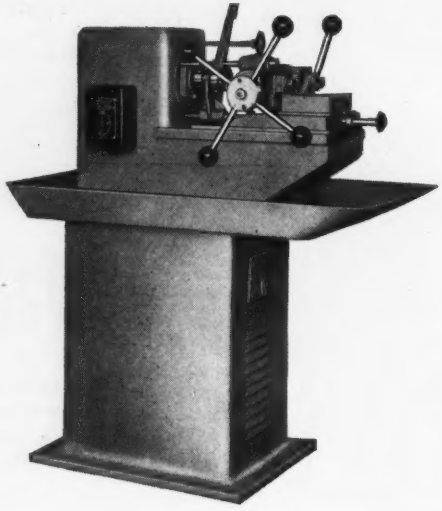
Our facilities assure
PROMPT DELIVERY
Ask your dealer or write direct for circular.

MANUFACTURED BY

RASMUSSEN MACHINE CO., INC. 9 Main St., Racine, Wis., U. S. A.

Have You a Copy?

New Booklet
Precision Threading Machines



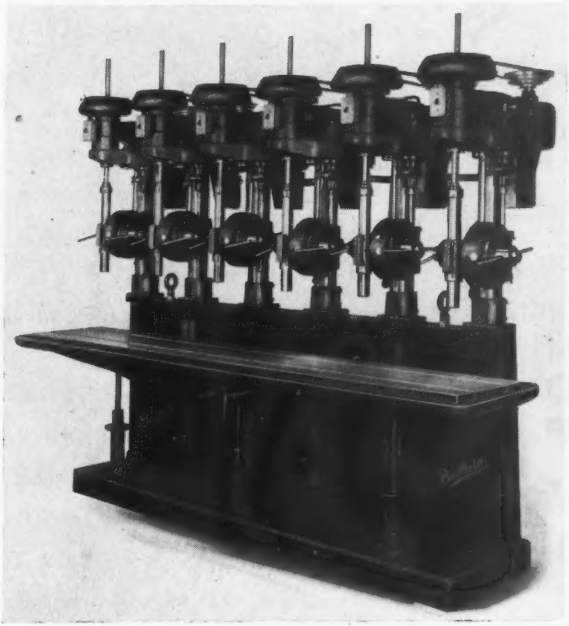
Built in three sizes, this new line of Geometric Threading Machines offers speed, ease of operation and above all accuracy. You will find many unique features incorporated in these machines, features you ought to know about if interested in production threading. Write for your copy of this new booklet.

The Geometric Tool Co.

NEW HAVEN, CONN.

PRODUCTION Flows

Smoother, Faster on these POWER FEED DRILLS



These 6-Spindle Drilling Machines will remove the "bottle-necks" from your drilling department. They represent the last word in power feed drills as you will readily see from these important advantages ---
Feed engaged by feed motion of handle — Feed positive requiring no adjustment — Depth dial read from front of machine — Feed change made while machine is running.
Here indeed is a drilling machine that will pay dividends fast.
Bulletin 3122 promptly sent on request.

BUFFALO FORGE COMPANY
388 BROADWAY • BUFFALO, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

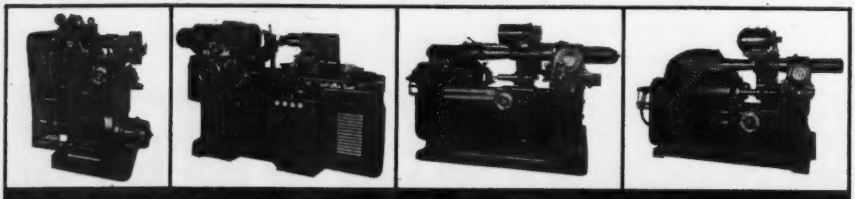
"Buffalo" No. 16 POWER FEED DRILLS

BRYANT GRINDERS

FOR EVERY INTERNAL AND FACE GRINDING NEED

THERE is a Bryant Grinder to meet every requirement of tool room work, small lot grinding, and high production work. The exclusive feature of BRYANT wheel head suspension is an outstanding asset when grinding straight, taper, a combination of straight and taper, or double taper holes in one operation, as well as curved, cam shaped, or blind holes. BRYANT Two-Spindle Grinders are a further asset in that the bore and face of the work may be ground concentric in one setting. BRYANT Grinders cover the complete range of internal and face grinding work—from tiny bearing races to large gears and cylinders. Send for catalogs.

Series 5 | **Series 112** | **Series 16** | **Series 24**



BRYANT CHUCKING GRINDER CO., Springfield, Vt.



An SKF Red Seal Bearing

THIS BEARING IS AIR-CONDITIONED!

. . . . BECAUSE the Certified Felt seal "breathes"; that is, it allows the air inside the bearing to pass out when it becomes heated and consequently expands; and also, when the bearing has cooled, the felt seal allows air to enter, excluding any dust or particles in the air which would be injurious to the life of the bearing.

This "air conditioning", and, at the same time effectively sealing a bearing, with Certified Felt seals assures one of maximum bearing performance.

Our research laboratory is at your disposal for whatever problems, new or old, you may have arising from the use of felt in the mechanical field. If you have a problem of sealing, consult our engineers.

• • • •

THE FELTERS COMPANY, INCORPORATED

210 South Street, Dept. L-1 **Boston, Massachusetts**

OFFICES IN PRINCIPAL CITIES



RESOLVE FOR 1940

TO

CUT COSTS

AND

SPEED PRODUCTION

WITH

ELECTRICAL TOOLS

Many new tools add their efficient aid to make this great line your best bet for 1940 . . . to put their shoulders to your wheels of progress . . . to save you time and dollars.

PRECISION LATHE GRINDERS



Write for new catalog

MODEL XX

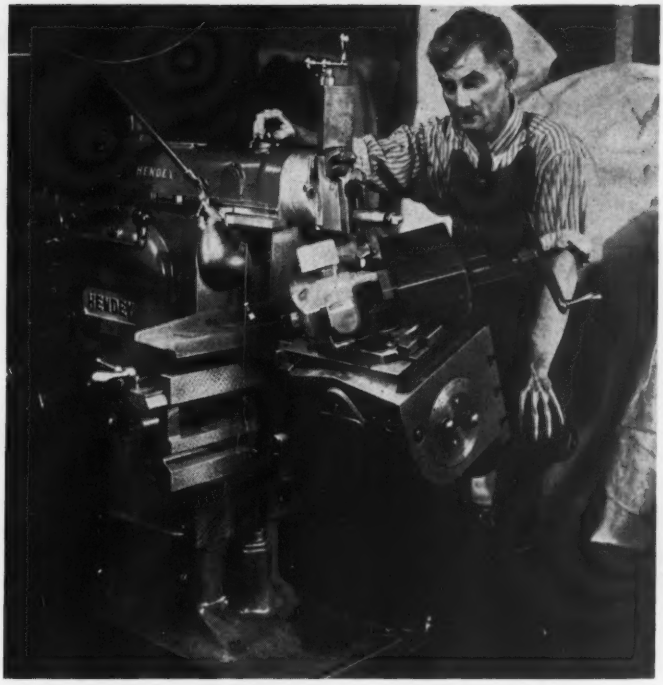
For external or internal grinding. Ball bearing grinding wheel spindles are interchangeable on corresponding sizes.

For use with lathe, planer, boring mill, milling machine, etc.

THE UNITED STATES ELECTRICAL TOOL CO.

THE GOOD MECHANIC'S CHOICE

CINCINNATI, OHIO, U.S.A.



HENDEY 12" UNIVERSAL TOOL ROOM SHAPER

The Hendey Shaper, while small in size has made a large number of firm friends who have found it to be an exceptionally capable tool. The picture shows one of these shapers in the plant of a nationally known manufacturer of graphite products in New Jersey. The tool maker has the machine set up with an unusual combination of table and vise angles to enable him to plane off the top of a projection on the forging he is working on.

Stroke of Ram - - - - - 12¾"	Horizontal travel of table - - - - - 17⅝"
Strokes per minute - - 14 to 200	
High speed on 6" stroke - - - - 182 ft. per min.	Surface of tilting top - - - - - - 10 x 12"
Vertical travel of tool slide - 4⅝"	H. P. of Motor - - - - - 2
Approximate net weight of shaper with Motor - - - - -	2,825 lbs.

Sales Offices

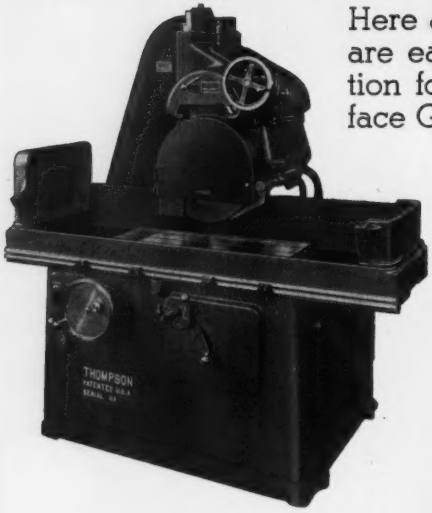
Boston Detroit
New York
Rochester
Chicago

Sales Agencies

Lloyd & Arms Co., Philadelphia
Barney Machinery Co., Pittsburgh
Jeffrey-Gillis, Cleveland
Henes-Morgan Machy. Co., Los Angeles
Jenison Machinery Co., San Francisco
J. H. Ryder Machinery Co., Toronto
T. E. Ryder Machinery Co., Montreal

THE HENDEY MACHINE CO. TORRINGTON • CONN. •

THOMPSON GRINDERS



Here are some of the features that are earning a cost-cutting reputation for Thompson-Hydraulic Surface Grinders:

Balanced "finger-tip" controls.
Speedy, cool cutting with hydraulic and automatic equipment.
Automatic wheel truer.
Dynamic balance.
Easily maintained accuracy.
Greatest possible economy.



A thoroughly field-tested broach grinding machine capable of cutting tool grinding costs to rock bottom . . . that's the Thompson. It's fast ...accurate...automatic.

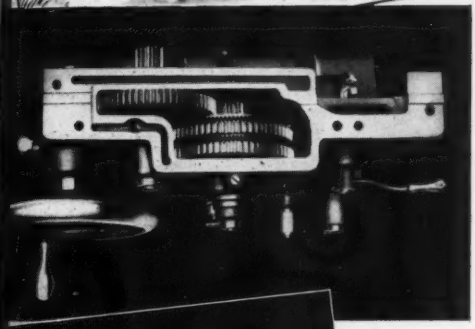
WRITE FOR CATALOG GIVING COMPLETE DETAILS.

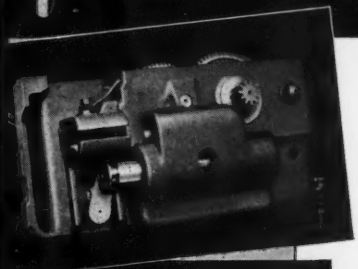
THE THOMPSON GRINDER COMPANY

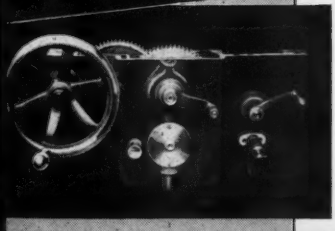
SPRINGFIELD • OHIO











THE LeBLOND POSITIVE JAW FEED CLUTCH

When LeBlond revolutionized apron operation by the positive jaw feed clutch—the big headache of friction feeds was cured. • This positively powerful—powerfully positive clutch spelled the end of slipping, sticking—trouble-making friction feeds. It marked the beginning of a new ease in lathe operation—new precision—new power—no more spoiled work or wrecked machines. • And just one lever controls this smooth, constant, powerful feed—both longitudinal and cross—just one lever—which also releases the apron gears when engaging the lead screw. In addition, an automatic stop provides full protection to the lathe. • Simple—Positive—Powerful—the positive jaw feed clutch is one among many features that assure outstanding performance—in Lathes by LeBlond.

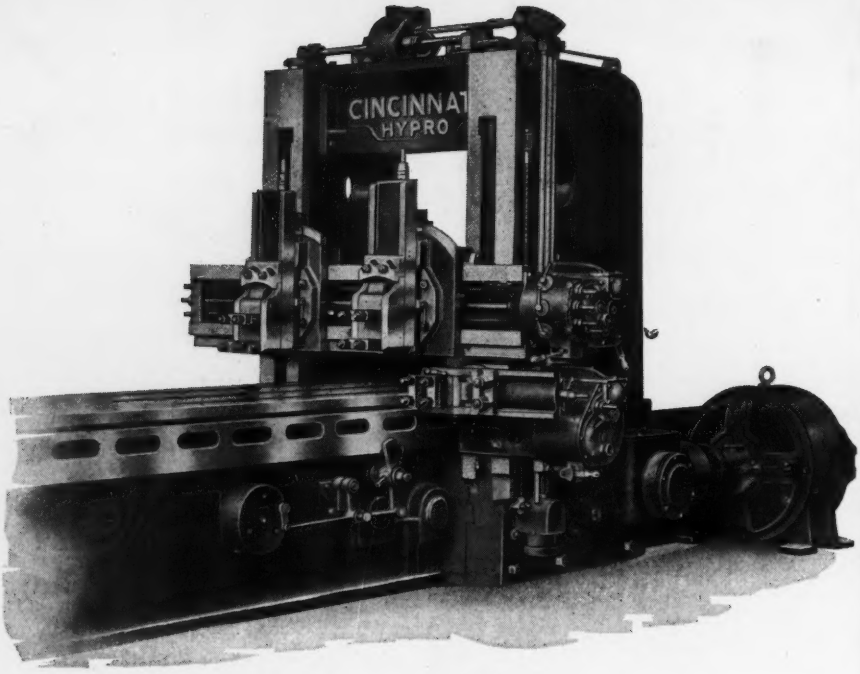
THE R. K. LeBLOND MACHINE TOOL CO.

DEPT. N-20 **CINCINNATI, OHIO**









All Herringbone Gearing to Table Drive

The smooth, even flow of power through the complete herringbone balanced gear train to the table produces smooth finished parts. It is a balanced drive free from any loss due to side pressure. Being an all steel unit flooded with oil, it is capable of withstanding the heaviest cuts for an indefinite time.

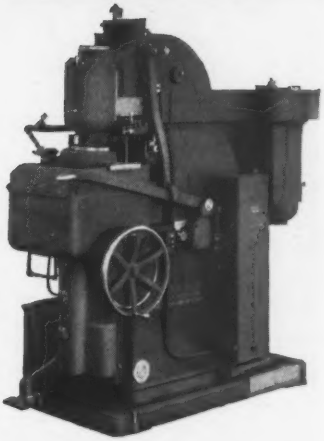
Other features: Selective Dial Feeds, Instantaneous Rail Lift, Renewable Steel Tee Slots, Independent Feeds and Rapid Power Traverse to the Heads, Reinforced Tool Block Abutment, Inverted Dovetail Slides, Massive Pyramid Type Housings, etc.

WRITE FOR COMPLETE CATALOG.

THE CINCINNATI PLANER CO. CINCINNATI OHIO, U. S. A.

WALKER

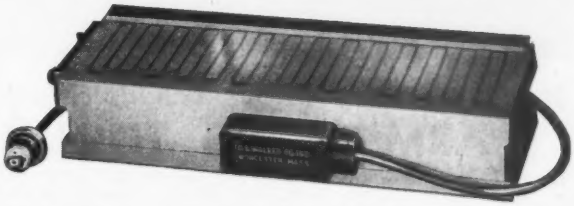
IMPROVED ROTARY SURFACE GRINDER



Raising or lowering wheel head automatically starts or stops the table and magnetizes or demagnetizes 12" magnetic chuck. Other features include wheel head locking device and adjustment of upper portion of column for grinding saws, cutters, etc., having hubs up to 6" diameter. Six table speeds are available and a foot brake facilitates quick stopping of table.

MAGNETIC CHUCKS

Right—No. 618 Standard Type Rectangular Magnetic Chuck. Available in sizes 4 x 8 to 30 x 96.



STANDARD ROTARY CHUCKS

6" TO 36" DIAMETER



Style D (right) for thin, small work, as well as for general grinding. Style B (left) is ideal for work of average size and thickness. Four standard styles, all interchangeable.

Ask for Circular W3.



O. S. WALKER COMPANY., INC.
WORCESTER • MASS.

ARMSTRONG



Step up your Tool Room schedule with more . . .

ARMSTRONG TOOL HOLDERS

The best solution for a jammed-up tool room is: More ARMSTRONG TOOL HOLDERS. With the right tool holders for every operation you can step up machine tool speeds and feeds far beyond the "standards" set in the old bar tool days.

The Armstrong System provides tool holders for every operation on lathes, planers, slotters and shapers—over 100 different sizes and shapes each correct in design and proportion, correct in cutting angle and tool approach; each the most efficient tool available for its particular work painstakingly worked out to give maximum rigidity with maximum clearance. Because ARMSTRONG TOOL HOLDERS are strong beyond need, handy and multi-purpose, there is a tendency in many shops to use a few tool holders for all types of work. This is false economy for the maximum efficiency can only be had with the correct type and correct size ARMSTRONG TOOL HOLDER for each operation and for each machine tool.

If you want to break the jam in your tool room, to turn out the same work in fewer machine hours, check the tool holders on lathes, planers, slotters and shapers against the new C-39 catalog. Then, when properly tooled, step-up speed and feeds.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

328 N. FRANCISCO AVE., CHICAGO, U. S. A.

Eastern Warehouse and Sales: 199 Lafayette St., New York

San Francisco London

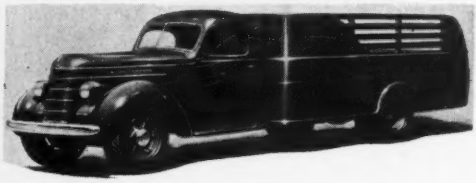
Buy ARMSTRONG TOOLS from your Supply House

ARMSTRONG TOOL HOLDERS Are Used in Over 96% of the Machine Shops and Tool Rooms

MODERN Machine Shop

CINCINNATI, OHIO

JANUARY, 1940 VOL. 12, NO. 8



Building "International" Trucks

The interesting features of a modern motor truck manufacturing plant are presented in this article.

By HOWARD CAMPBELL
Editor, MODERN MACHINE SHOP

AN important part in the machinery of present-day living is the modern motor truck. Geared to the tempo of our times, so to speak, the motor truck has simplified the material handling problems of commerce and industry, reducing the time and labor formerly spent in loading and unloading, shortening the carrying time, and making possible a service which for speed and convenience is in keeping with the age.

In the van of American motor truck manufacturers is the International Harvester Company, which maintains plants for truck manufacturing at Springfield, Ohio; Indianapolis, Indiana, and Ft. Wayne, Indiana. Truck motors are built at Indianapolis, light trucks, bodies, and fenders at the Springfield plant, and the heavy trucks at Ft. Wayne, Indiana. The Ft. Wayne Works also includes a huge machine shop in which many of the parts for all trucks are processed. This article will be devoted to a description of the Ft. Wayne plant.

The larger part of the manufacturing operations at the Ft. Wayne plant are housed in three factory buildings of modern "daylight" construction and covering 24 acres of

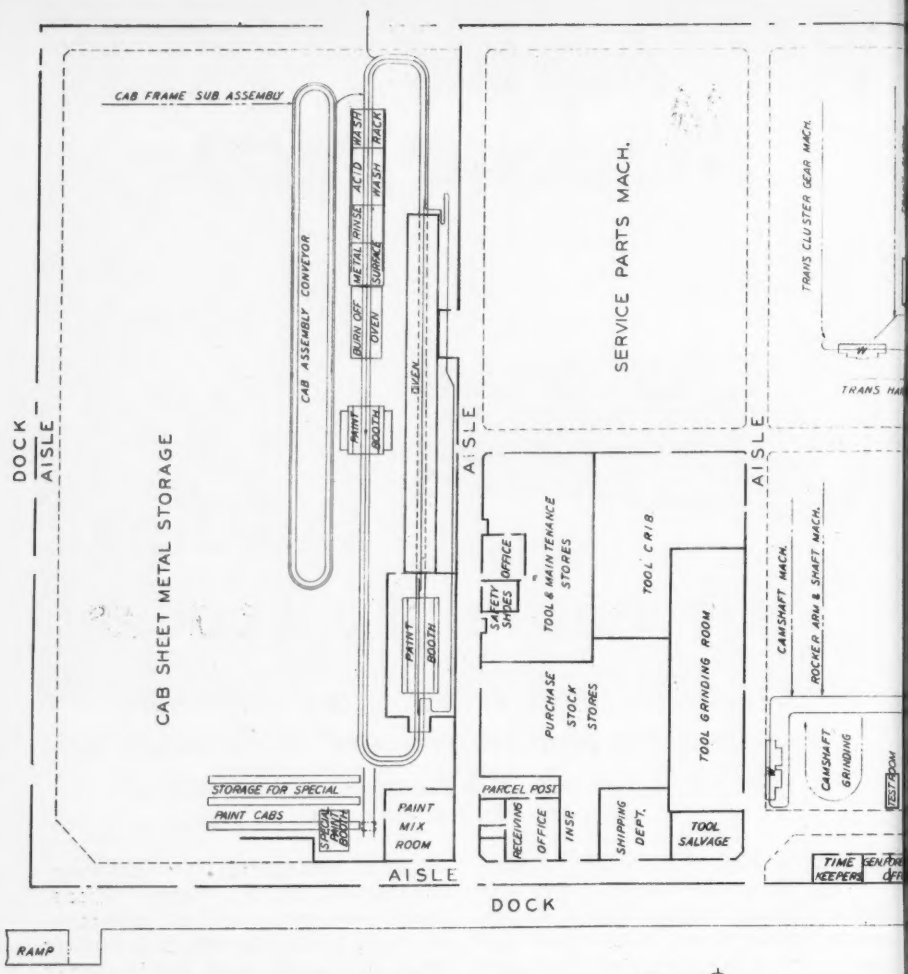


Fig. 1—General Layout of Machine Department at International Harvester Works, Fort Wayne, Indiana.

ground. The two most important sections of the plant, insofar as this article is concerned, are the machine shop and the assembly buildings.

The general layout of the machine shop is shown in the plan drawing Fig. 1. The waste inherent in manual

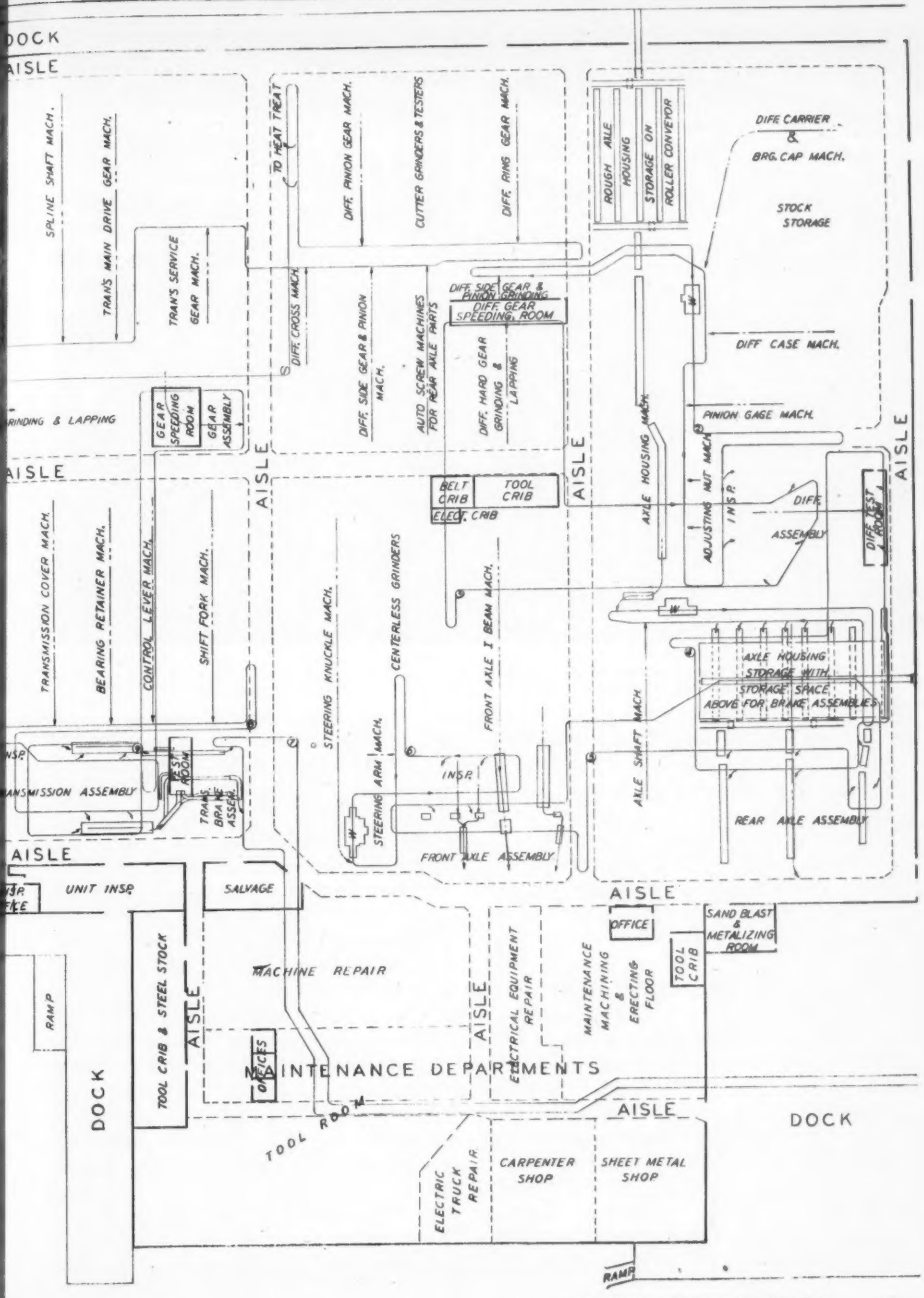

DOCK
AISLE
SPLINE SHAFT MACH.
TRANS MAIN DRIVE GEAR MACH.
TRANS SERVICE GEAR MACH.
TO HEAT TREAT
DIFF. PINION GEAR MACH.
CUTTER GRINDERS & TESTERS
DIFF. RING GEAR MACH.
ROUGH AXLE HOUSING STORAGE ON ROLLER CONVEYOR
DIFF CARRIER & BRG. CAP MACH.
STOCK STORAGE
DIFF. CROSS MACH.
DIFF. SIDE GEAR & PINION MACH.
AUTO. SCREW MACHINES FOR REAR AXLE PARTS
DIFF. HARD GEAR GRINDING & LAPPING
DIFF. SIDE GEAR & PINION GRINDING
DIFF. GEAR SPEEDING ROOM
DIFF CASE MACH.
PINION GAGE MACH.
GEAR SPEEDING ROOM
GEAR ASSEMBLY
GRINDING & LAPPING
AISLE
BELT CRIB
TOOL CRIB
ELECT. CRIB
AXLE HOUSING MACH.
ADJUSTING NUT MACH.
INSP.
DIFF. ASSEMBLY
DIFF. TEST ROOM
TRANSMISSION COVER MACH.
BEARING RETAINER MACH.
CONTROL LEVER MACH.
SHIFT FORK MACH.
STEERING KNUCKLE MACH.
CENTERLESS GRINDERS
FRONT AXLE I BEAM MACH.
AXLE HOUSING STORAGE WITH STORAGE SPACE ABOVE FOR BRAKE ASSEMBLIES
AXLE SHAFT MACH.
INSP.
TRANSMISSION ASSEMBLY
TEST ROOM
TRANS BRAKE ASSEM.
STEERING ARM MACH.
FRONT AXLE ASSEMBLY
REAR AXLE ASSEMBLY
UNIT INSP.
SALVAGE
OFFICE
SAND BLAST & METALIZING ROOM
TOOL CRIB
MACHINE REPAIR
ELECTRICAL EQUIPMENT REPAIR
MAINTENANCE MACHINING & ERECTING FLOOR
RAMP
TOOL CRIB & STEEL STOCK
OFFICES
MAINTENANCE DEPARTMENTS
TOOL ROOM
ELECTRIC TRUCK REPAIR
CARPENTER SHOP
SHEET METAL SHOP
RAMP



Fig. 2—Looking at one corner of the transmission assembly department showing the overhead conveyors transporting material to and from the department.

handling of material has been eliminated as far as possible by the use of mechanical handling devices of which the most important are the overhead conveyors.

It will be noted that, as far as possible, the machines are located in progressive order according to the operations to which they are allotted so that the rough stock can be started at one end of a production line and finish at the other end, eliminating the need for handling between machining operations and making possible a continuous flow of work from rough to finish stock. The arrows on the drawing designate the direction of work flow.

As far as possible, related parts are machined in adjacent departments; thus the transmission case and transmission gear machining departments are located as close together as the operations will permit. As the parts reach the ends of their several machining lines, they pass into an inspection department where they are checked over with testing and inspection equipment of the latest type. The parts that pass inspection are moved on through the inspection department and through the unit assembly department.

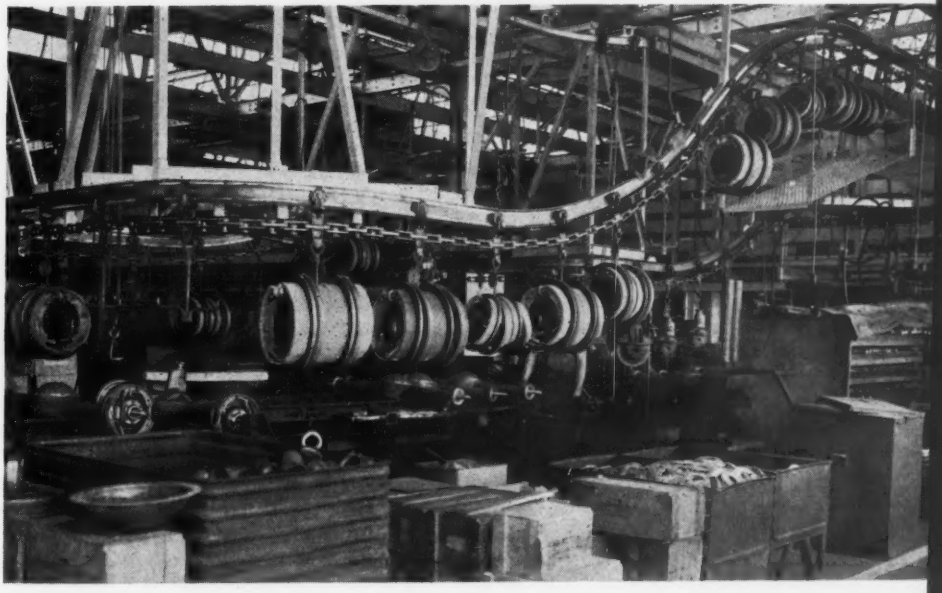
The photograph Fig. 2 shows one of the overhead conveyors carrying racks of cluster gears, transmission cases, trays of small parts, and other similar parts from the machining department to the assembly conveyors where they are to be used. As a matter of fact, there are four different overhead conveyors visible in this picture, each designed and planned to transport certain parts from machin-

ing to assembly departments.

The illustration Fig. 3 shows a corner of the rear axle assembly department, where an overhead conveyor can be seen carrying brake drums. Just to the rear of the brake drum conveyor is a similar conveyor carrying differential assemblies from the gear test department to be assembled to the rear axles. Underneath the overhead conveyor can be seen a number of axle housings which are brought direct from the axle housing machining department by means of an overhead conveyor. Differentials are assembled, brakes are assembled, and the axle housing assemblies are completed at this point.

Practically all of the overhead conveyors that serve the machine shop are indicated on the drawing Fig. 1, each conveyor line being indicated by a line on the drawing with arrowheads at intervals to indicate the direction of flow of the work. Thus the flow of steering knuckles is shown through the machining operations, through the washing machine in which they are cleaned after machining, into the inspection department, and through into the front axle assembly. The conveyor which carries the axle housings from storage to the rear axle assembly department is also indicated with arrows showing the direction of movement of the work. At the southeast corner of the building, as indicated on the drawing, can be seen the roller conveyors which provide for storage of rough axle housings with the single roller conveyor extending through the machining department and to the point where the housings are hung on an overhead conveyor for movement to the finished storage and thence to

Fig. 3—Corner of rear axle assembly department. Brake assemblies are brought in on an overhead conveyor and axle housings come to the department via an overhead conveyor.



axle assembly.

At the north end of the building, also, is located the cab assembly conveyor line and the line which carries the cab assemblies through the paint booth and drying ovens. The cab assembly and painting operations will be described in the second half of this article.

Having covered the general layout of the machining department, we will turn to the more interesting of the individual machining operations.

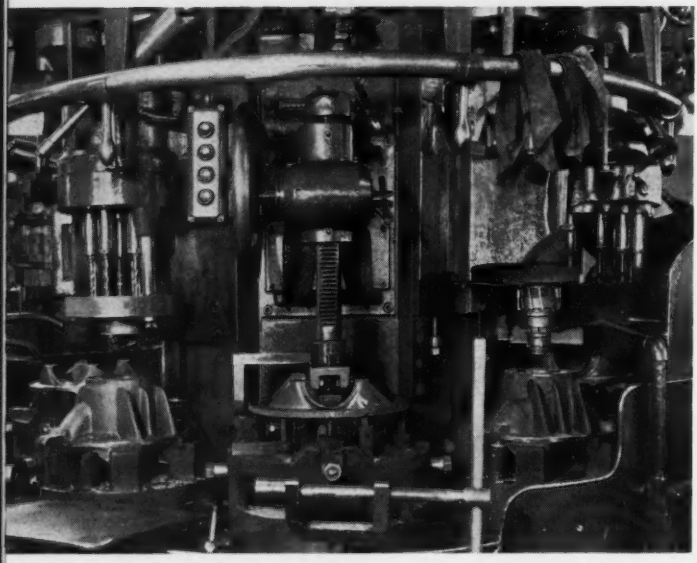


Fig. 4 — Differential carriers are machined in this Bullard Mult-Au-Matic.

An unusually interesting machine is the Bullard Mult-Au-Matic shown in Fig. 4, set up for machining differential carriers. Double indexing is applied here, the machine making one revolution with the carrier in one position and a second revolution with the carrier reversed in order to machine both sides.

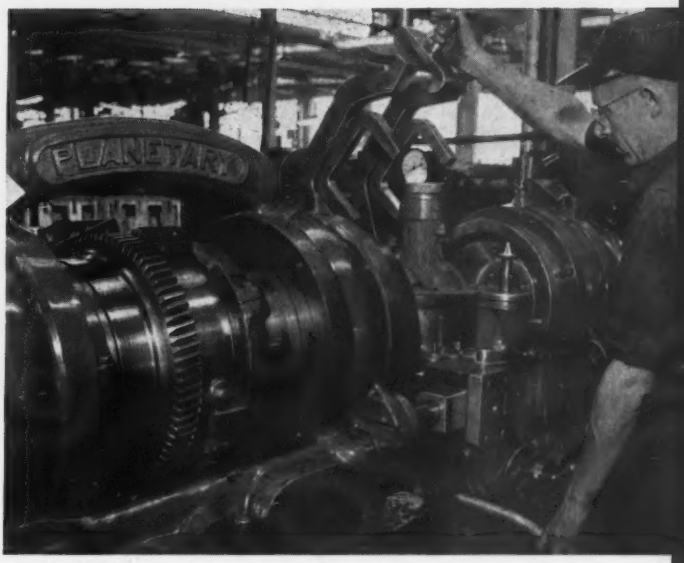
In the first part of the operation the carrier is located with the flange side up, making it possible to face and turn the flange, finish the pedestal, and drill 12 holes in the flange and 4 in the pedestal. A multiple spindle drill head is used for the drilling operations.

In the second revolution of the table the work is reversed, being located in the fixture by means of the finished section of the flange. In the second half of the operation the pinion holes are bored and faced and all holes in the pinion end are drilled. As this is a relatively short operation, it is done while the operator is changing pieces at Station 1, and is completed when he is ready to remove the finished piece from Station 2. The carriers are of malleable iron, and the production on this operation is 23 pieces per hour complete.

The picture was taken from a point directly in front of the loading station, showing the rack-and-pinion operated ram used to locate the work properly in the fixture so that the stock on the cross bore will be equalized. The locating ram is operated by a large handwheel which can be seen in the illustration.

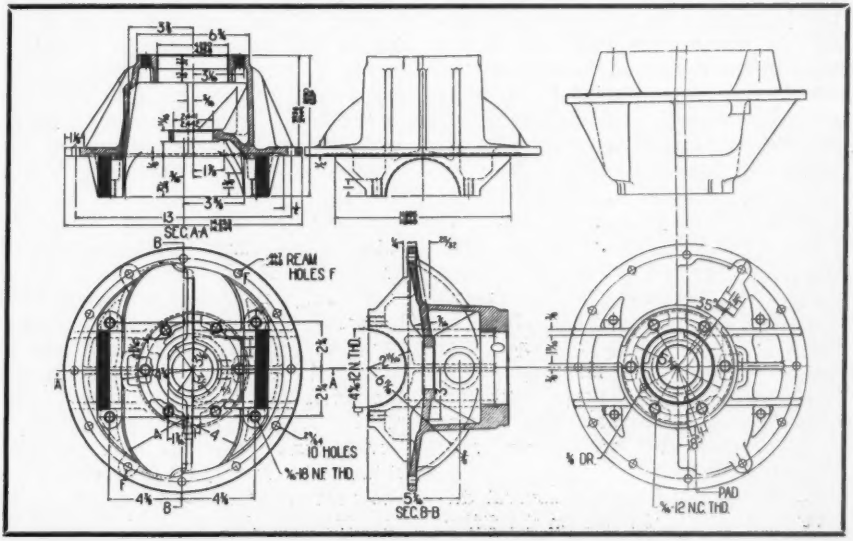
The cross bores in the differential carriers are bored and the threads are milled in the Hall planetary machine shown in Fig. 5. To a large

Fig. 5—The cross bores in the differential carriers are bored and the threads are milled in this Hall planetary machine, which assures that the threads will be absolutely concentric with the bores.



extent the smoothness of operation of the gears in the differential depends upon the accuracy with which these cross bores are machined, consequently it is imperative that the bores be machined accurately and in perfect alignment with each other and that the threading be done just as accurately and without moving the carrier between boring and threading. The Hall planetary machine meets the requirements of this job. Both the threads and the bores have to be positively con-

Fig. 6—Drawing of I. H. C. Truck Differential Carrier



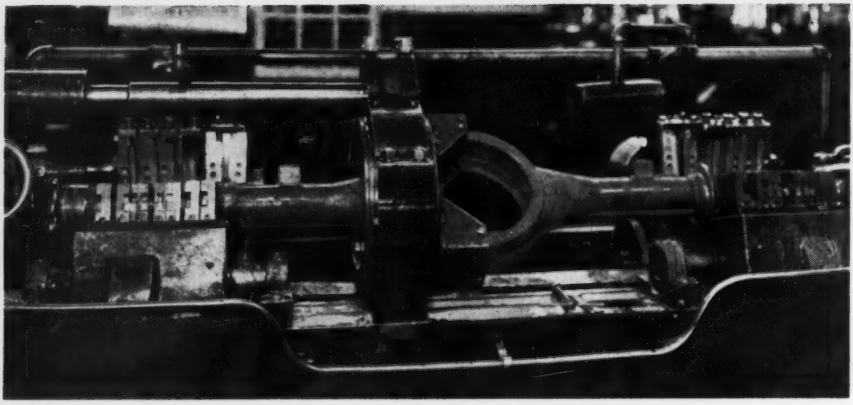


Fig. 7—Turning and facing the end bearings and flanges on the rear axle housing.

centric to each other.

The machine is of double-end design, the workpiece being chucked in the center between the two horizontal spindles. In chucking, the differential carrier is set down over an arbor which is located vertically in the center of the chuck with the flange of the carrier locating on a locating ring on the top of the chuck. Alignment of the bores with the spindles is ensured by means of a locating pin which slips into one of the holes in the flange of the carrier, the hole having been reamed to serve as a locating hole. With the carrier in position, the clamping lever is pulled down and locked firmly in position by means of a latch, pressure being applied by hydraulic mechanism.

The two planetary heads on the two spindles now move in toward each other, the cutter feeding in and finishing the bores and milling the threads simultaneously. When finished, the cross bore must be within 0.003 in. of being square with the pinion bore when measured at a point 9 in. on each side of the center of the pinion bore.

Inasmuch as there are several different pitches of threads on the differential carriers, universal master cams are used in the planetary heads whereby the gears can be changed to obtain any pitch of thread. The double end planetary is a high production machine, and is especially adaptable for such a job as this due to its rigidity and extreme accuracy.

The first machining operation on the rear axle housing is that of turning the end bearings, which is performed in the LeBlond center drive double end lathe shown in operation in Fig. 7. The housing is forged from seamless steel tubing. With the ends of the housing located on centers at each end, the piece is chucked at the center for driving, leaving each end clear for the cutting tools. To turn each end and face the end and both sides of the flange eight single tools are used and six form tools. After once being set, these tools are located by stops and are fed automatically; thus the operator is required only to set the tools, throw in the feed, run the tools back, and change workpieces between operations. Production is nine pieces per hour per machine. The important dimensions on the rear axle housing are shown in the drawing Fig. 8.

The center or "banjo" section of the rear axle housing is bored and faced complete on both sides in the Snyder vertical facing machine shown set up in Fig. 9. The boring and facing operation is completed simultaneously with an inserted tooth cutter which is piloted in the fixture, the cutter blades being set to bore the hole to 12¾-in. diameter and machine the face over a diameter of 16 in. Instant clamping is one of the features of this job, the clamp being operated hydraulically and thus controlled by the movement of a lever. The same cutter is used to machine both sides, the piece being released, revolved, and clamped between opera-

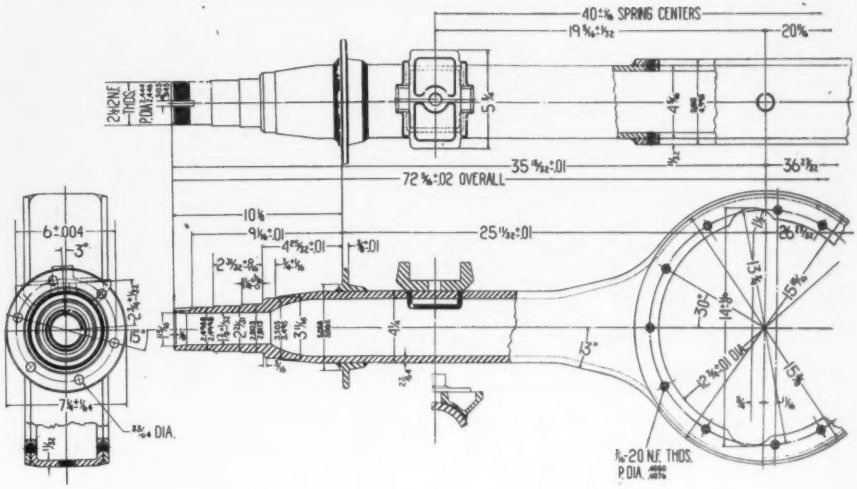


Fig. 8—Drawing showing dimensions of I. H. C. truck rear axle housing.

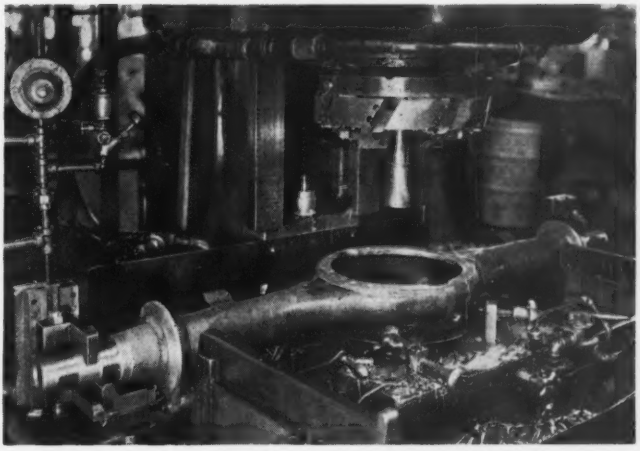


Fig. 9—The center or "banjo" section of the rear axle housing is bored and faced complete on both sides in this vertical milling machine.



Fig. 10—Transmission cases are milled on three sides in the Newton rotary double spindle mill at the right and the main shaft holes are finished, the idler gear shaft hole is drilled, and the pull rod holes are drilled in the Barnes horizontal machine at the left.

tions. In spite of the comparatively large size of the work and the tool, 22 pieces are machined complete per hour.

The illustration Fig. 10 shows two machines at work on transmission cases. At the right is a Newton vertical double spindle rotary milling machine, used to rough and finish mill the ends of the cases, and at the left is a horizontal Barnes drilling and reaming machine, used to bore and ream the main bores.

The table of the milling machine holds nine pieces, providing for a triple set-up of three pieces on each of three different operations. The two spindles provide for roughing and finishing in the same set-up. In the first operation on each piece, three pieces are set up to have one end milled. In the second revolution of the table these pieces are changed to a second set of fixtures so that the opposite end can be milled, and in the third operation they are removed to a third set of fixtures so that the faces of the three pieces can be milled. Thus with each revolution of the table three pieces are completely finished and three new pieces are clamped in position for machining. The roughing cutter leaves 0.015 in. for finishing and production on the milling operation is 20 finished cases per hour.

In the horizontal boring and reaming machine the main holes are rough and semi-finish bored and semi-finish reamed, the idler gear shaft hole is drilled, and the pull rod holes are drilled. The final reaming of the main holes takes place in a subsequent operation. Two hundred pieces are drilled and reamed on this machine in eight hours.

The importance of accurately machined gears as a factor in the efficiency and quiet operation of the modern motor truck is recognized in this plant and, accordingly, the gear cutting equipment is of the latest type available. Figure 11 is a picture of a Gleason No. 9 completing



mill
the

be
of
ely
are
ng.
in.
the
ses

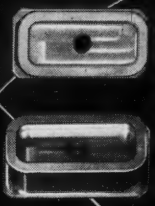
am-
ugh
ish
is
are
the
ose-
ces
na-

na-
effi-
the
in
ear
est
pic-
ing

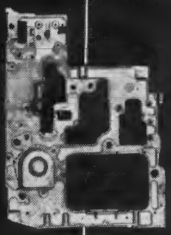
940



FROM *Blue-Print* INTO *Steel* IN A SINGLE SET-UP

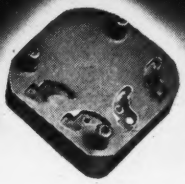


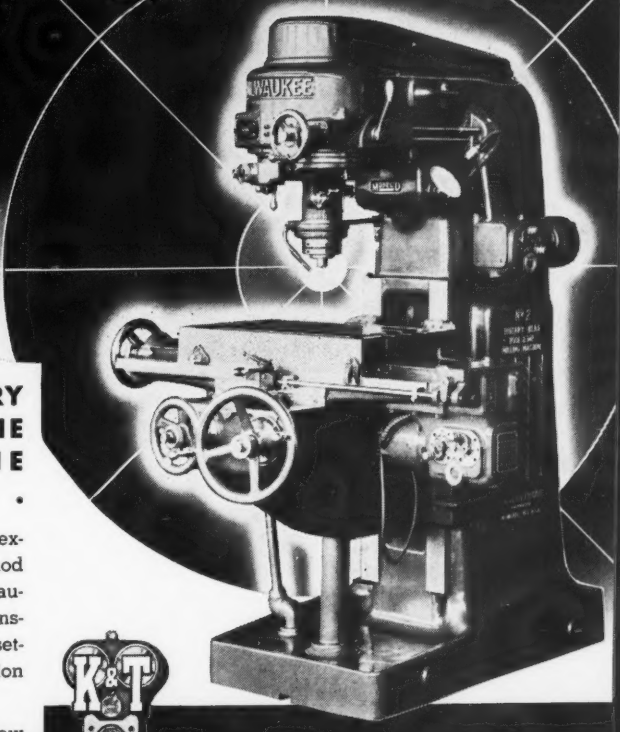
FORMING DIE
Milled from solid to tolerances of .0005 in 4¼ hours. Can be group milled in lots of 6 at the rate of 2½ hours per piece.



DIE CAST TIME CLOCK FRAME
Note numerous radii and great amount of detail work — produced with speed and accuracy on the Model D.

DISTRIBUTOR COUNTER WEIGHT
All four cavities completed in a total time of 72 hours — previous time, ordinary equipment, 156 hours.





EXAMPLES OF ROTARY HEAD TOOL AND DIE MILLING MACHINE PERFORMANCE . . .

HERE are a few of hundreds of examples of the Rotary Head Method of tool and die making with a Milwaukee Model D — the machine that transmits blueprint into steel in a single set-up — layout, milling, drilling, precision boring and slotting operations!

Investigate this machine and the new technique it offers for the production of dies and tools—in far less time, with positive accuracy, and at costs much lower than ever thought possible.

KEARNEY & TRECKER CORPORATION
Milwaukee, Wisconsin, U.S.A.

Milwaukee
MODEL D-ROTARY HEAD TOOL AND DIE MILLING MACHINE

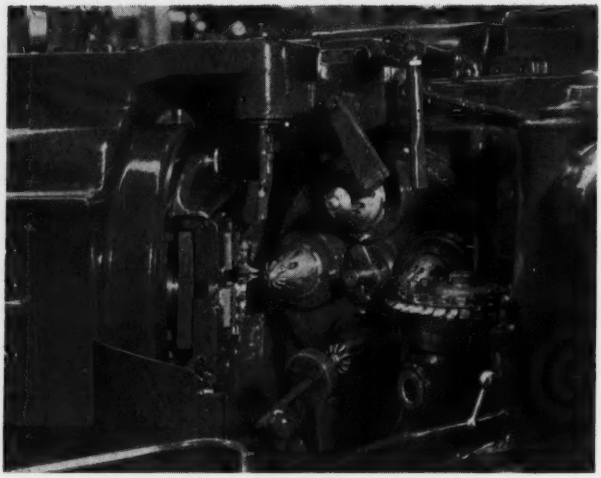


Fig. 11—Pinion teeth are roughed and finished complete in this four-spindle generator.

generator, designed for the rough and finish cutting of the teeth of straight bevel gears or pinions. Both of these operations — roughing and finishing — are accomplished with one chucking of the piece. The machine is of the station-to-station type, the design including a rotary turret in which four horizontal work spindles are mounted. The uppermost position is the loading station, the blank being automatically secured in place as the turret advances it to the roughing station.

The roughing cutter is mounted on a vertical spindle so that it operates horizontally, the cutting speed being variable from 104 to 202 ft. per minute. The cutter is of the inserted tooth type and is approximately 10¾ in. in diameter. The blades are sharpened on a machine especially built for the purpose and a gage is used for locating the roughing head in the correct position on the machine after the blades have been sharpened.

At the roughing station the blank is automatically indexed, the roughing cutter being alternately fed into and withdrawn from engagement with the blank as each cut is completed. After all the teeth have been roughed, the turret advances the blank to an intermediate station where a simple gaging device stops the machine from further operation unless all teeth have been roughed to full depth. From here the blank moves to the finishing station where each tooth is finished by tools of the same type as those used on other Gleason straight bevel gear generators of the two-tool type. After finish cutting, the turret indexes the blank to the loading sta-

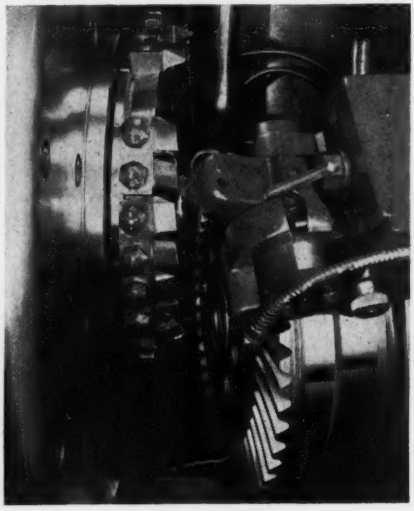


Fig. 12—The teeth on spiral bevel ring gears are finished in this machine.



Every plant manager who has or contemplates a tool room should know all about this brand new Cincinnati Bickford product.
It is the Super Service Jig Boring Machine announced only last September and already "going places."
Get full information by writing for Bulletin U-26.

THE CINCINNATI BICKFORD TOOL CO.
OAKLEY CINCINNATI OHIO U.S.A.

tion where it is automatically released to be removed by the operator. Thus one finished pinion is obtained for every 90 deg. movement of the turret drum. One operator operates two machines, one machine on pinions and one on gears. The pinion machine produces 400 finished pinions in eight hours and the other machine produces 260 gears in the same period.

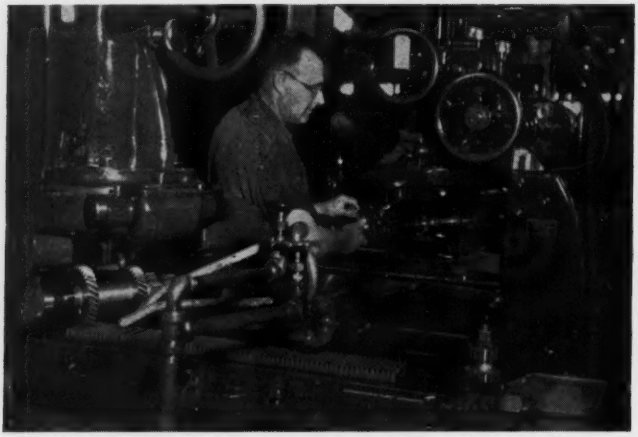


Fig. 13—The "shaving" process is used to finish helical gear teeth to the correct contour and size. Two Michigan gear finishers are shown at work in this illustration.

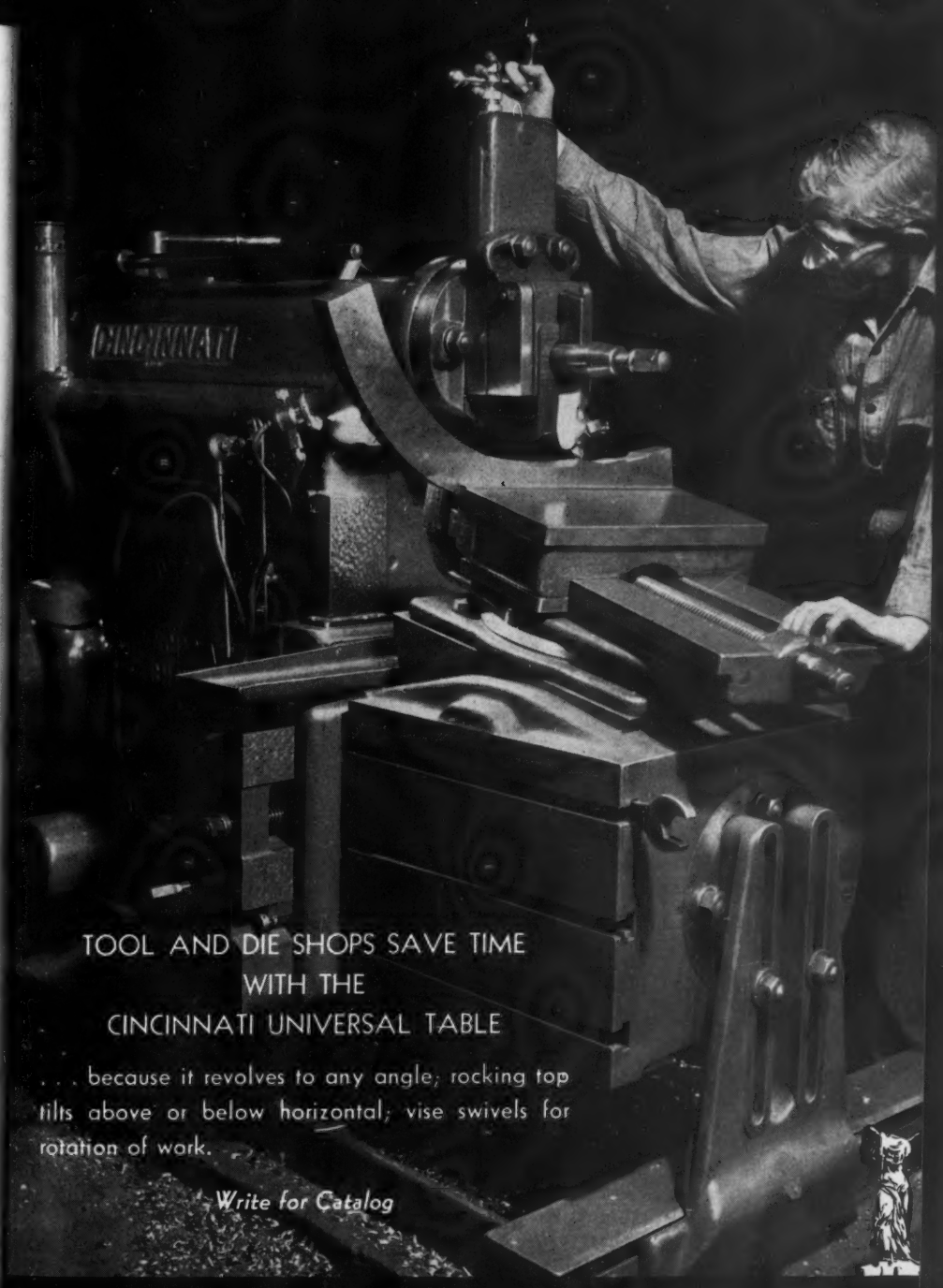
The illustration Fig. 12 is a close-up view of the cutter on a Gleason No. 22 single cycle finisher finish cutting ring gears. This machine is said to be the fastest yet devised for finish cutting the spiral bevel and hypoid ring gears used in automobile drives. The gears are rough cut in standard Gleason roughing machines and transferred to this machine for finish cutting.

The cutter and gear remain in normal full depth operating position during the entire machine cycle, provision being made for indexing by a gap in the cutter which follows after the second series of blades. When the gap in the cutter comes abreast of the blank, the blank is indexed. The cutter rotates at a uniform speed and when the cutter revolves equal the number of teeth in the gear, the gear is finished. Extremely accurate tooth spacing is obtained as a result of the exceptionally rigid construction of the machine, the light cuts taken by each blade, and the fact that the same two blades finish each tooth space.

The manual part of the operation has been reduced to the minimum, the piece being chucked and dechucked by power. Operation of the control lever clamps the gear to the arbor, advances the workhead to cutting position, and clamps the workhead. An automatic stop eliminates any possibility of re-cutting the tooth. On the ring gears shown, this machine operates at a speed of 8.5 seconds per tooth space, which equals a speed of 9 gears per hour based on an efficiency of 80 per cent.

Countershaft gears of the helical type are finished in the Michigan gear finishing machines shown in operation in Fig. 13. In this machine the cutter rack, which is located on the table, reciprocates and shaves from 0.0002 to 0.0003 in. of stock off the teeth with each reciprocation, the head feeding slowly down as the reciprocating action takes place.

Approximately 0.0025 in. of stock is removed from each side of each



TOOL AND DIE SHOPS SAVE TIME
WITH THE
CINCINNATI UNIVERSAL TABLE

. . . because it revolves to any angle; rocking top tilts above or below horizontal; vise swivels for rotation of work.

Write for Catalog

THE CINCINNATI SHAPER COMPANY, CINCINNATI, OHIO
SHAPERS • SHEARS • BRAKES

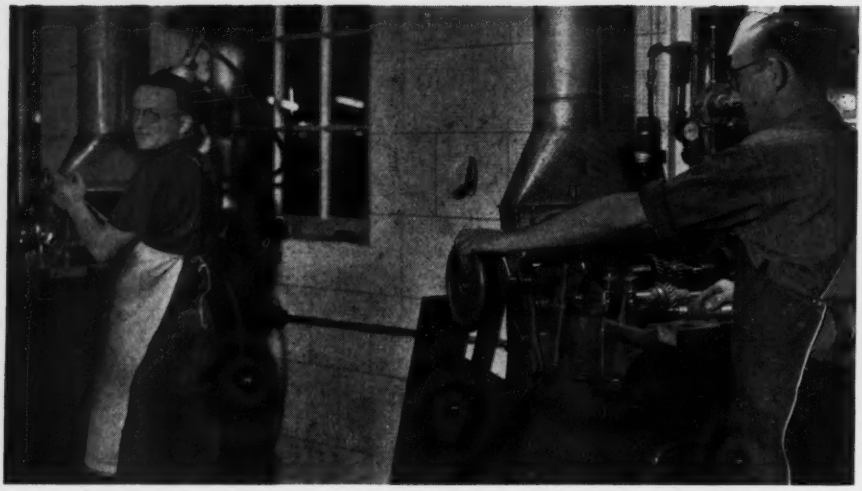


Fig. 14—All gears are checked for possible noise and corrected in these "Red Ring" gear speeders. Nicks are removed with a small, light "Keller" air grinder.

tooth, finishing the tooth to within a tolerance of 0.0002 in. both for spacing and for profile. The gear shown in process in the machine immediately in the foreground is a 7-9 P. gear with ¾-in. face. Production on this operation is approximately 45 pieces per hour.

However carefully a gear or pinion is machined, in the process of handling or hardening small nicks will appear which, if left in the gear, will frequently cause gear trouble out of all proportion to the size of the nick. To ensure that the gears which go into I.H.C. trucks are free from nicks or high spots, each gear is put into a "Red Ring" gear speeder where it is run in mesh with its mating gear at a high rate of speed. The gear speeders are segregated from the rest of the shop in a sound-proofed room as shown in Fig. 14.

The gears to be checked are mounted on two accurately aligned spindles which are free from bearing noises of any kind. A specially built multiple speed motor provides four speeds forward and four speeds in reverse, which permits testing the gears in both directions of travel and throughout an ample speed range. The area within which the gears operate is directly in the opening to a sound amplifier which eliminates all interference from sounds other than those produced by the gears under test while at the same time amplifying the gear noise approximately 50 times. The horn directs all sounds originating in the sound box directly to the inspector's ear.

If the gear seems unduly noisy, the operator examines the teeth for possible nicks and colors the teeth with a thin coating of red lead to check correct tooth bearing, after which he speeds the gears again. Upon stopping the machine the second time, the smallest nicks will be immediately apparent as shiny spots. The operator then removes these nicks by means of a small, light air grinder and re-tests the gears. When the

A HIGHER QUALITY FINISH IN 50% LESS GROOVING TIME

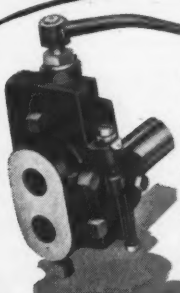
WITH THE NEW

WARNER & SWASEY QUICK ACTING SLIDE TOOL

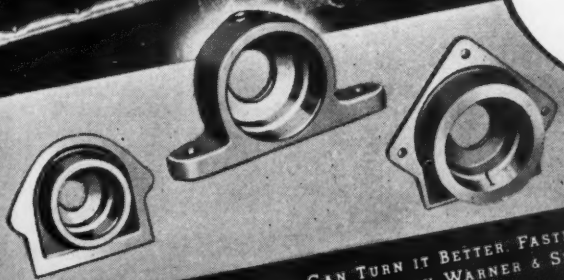


A new Warner & Swasey Slide Tool made an immediate 50% time saving in grooving work at the Reeves Pulley Co., Columbus, Indiana. The work is on various types and sizes of cast iron bearing housings ranging in lots of 50 to 300 pieces. Typical examples of this work are detailed below. With the new slide tool the operator cuts grooves with less than a quarter turn of the handle, where five or six turns were required with the old style slide tool. The rigidity and smooth action of the tool allows faster feeds and produces a higher quality finish on each part.

If you have grooving operations, a new Warner & Swasey Quick Acting Slide Tool will cut your machinery time. You will find complete information on this tool on page 39 of your new Warner & Swasey Turret Lathe Tool Catalog. For prices on this tool, or further information, write



Here's the new Warner & Swasey Slide Tool for fast recessing and facing cuts. An ideal tool for inside facing cuts which must have a smooth surface. A large micrometer dial makes adjustments of cutters a big time saver.



WARNER & SWASEY
Turret Lathes
Cleveland

YOU CAN TURN IT BETTER, FASTER, FOR LESS ...WITH WARNER & SWASEY TOOLS

gears leave this operation, they are as noiseless as present-day methods can make them.

One of the many broaching machines used in this plant is shown in Fig. 15. This machine, which is an American vertical broaching machine, is set up to surface broach both sides

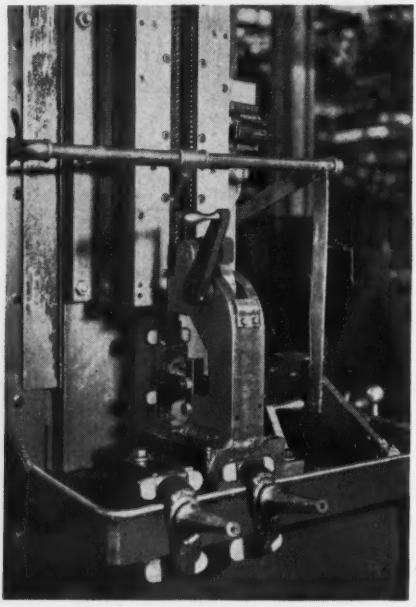


Fig. 15—One of the many broaching machines at work in this plant. This machine is set up to broach the ears on the steering knuckle. Two finished knuckles can be seen hanging on the front of the machine.

of the four ears on the steering knuckle, two of which are shown resting on the edge of the oil pan at the front corner of the machine. The steering knuckles are of drop forged steel and have been heat treated.

The steering knuckle is held in a fixture into which it is clamped by a single movement of the lever and unclamped in the same manner. Removing from 1/16 to 3/32 in. of stock on a side, approximately 100 pieces per hour are finished in this machine. It is of interest to note that from 5,000 to 6,000 pieces are broached with one set of cutters before the cutters need regrinding.

(Second half of this article will be published in the February issue of this magazine.)

Baldwin Roller Chain Catalog M. The Baldwin-Duckworth Chain Corp., Springfield, Mass., has issued Catalog M describing the company's complete line of single and multiple strand roller chains, sprockets, and specialties. The catalog is over one-third larger than the previous one issued. It is attractively printed in color and is profusely illustrated with application photographs. Over 30 pages of vital engineering data will be found indispensable to machine designers and maintenance men who want to quickly determine the correct chain and installation data for all types of applications. Speeds, sprocket ratios, chain tension, adjustment idlers, correct lubrication, horsepower diagrams and tables for transmitting up to 600 h.p., plus several pages of important formulas, are typical of the data included.

The broadening field of roller chain is indicated by the variety of standard attachments now available, plus such developments as extended pitch chains and flat-top conveyor chain of various types. Increased space is devoted to the Baldwin-Duckworth line of chain flexible couplings, and new data on selection and installation is also given.

Copy of Catalog M will be sent free to any mechanical executive who will address a request on his company letterhead.

Zeiss Gear Testing Machine. The Zeiss Gear Testing Machine, designed for use in measuring pitch, tooth thickness, concentricity of width and tooth space in spur, bevel, helical and worm gears as well as pitch and concentricity in notched index disks, is discussed in a 14-page bulletin published by Carl Zeiss, Inc., 485 Fifth Ave., New York, N. Y.

Included in the bulletin are several illustrations showing the application of the Zeiss Gear Testing Machine to worm, helical and bevel gears. Appearing with each illustration is a diagram to further illustrate these applications. Copy free upon request.

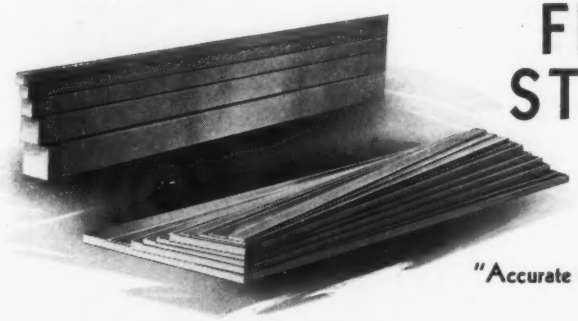
HOW MUCH CAN *YOU* SAVE?

ON PARTS LIKE THESE

TEST TOOLS	PUNCH DIES
DIE WORK	FLAT GAGES
JIGS	TEST GAGES
FIXTURES	SNAP GAGES
PARALLELS	STAMPS
MACHINE PARTS	CUTTERS
SHIMS	TEMPLATES

Save valuable time making these small parts. No hunting for stock, no grinding to size — just lay out the part and go ahead. Starrett Ground Flat Stock No. 495 comes in 18-inch lengths in a complete range of widths and thicknesses. Made of high grade tool steel and ground to within .001" in thickness, it is carefully annealed for easy machining. Each piece individually packed and marked for quick identification. Carried in stock by your Mill Supply Dealer. See complete list of sizes and prices in Starrett Catalog No. 26-MD. Write for a copy, also special folder on Starrett Ground Flat Stock.

Starrett GROUND FLAT STOCK



"Accurate to within ONE THOUSANDTH"

THE L. S. STARRETT CO., ATHOL, MASS., U. S. A.

World's Greatest Toolmakers — Manufacturers of Hacksaws Unexcelled — Steel Tapes, Standard for Accuracy — Dial Indicators for Every Requirement

Standardize on

STARRETT TOOLS

BUY THROUGH YOUR DISTRIBUTOR



Lost Time CUT TO THE BONE

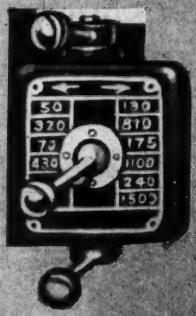
No time lost in speed changing. No confusion in securing desired speed. The simplest and fastest speed control is offered by the "American" Hole Wizard. No more reading of confusing speed plates and juggling of levers to secure desired speeds.

The Hole Wizard speed change is direct reading—2 levers—one ball shift and one 2-position back gear lever on the 12-speed and only one ball shift lever on the 9-speed machine.

Simply throw the lever or levers to the selected speed shown on the plate—that's all there is to it.

The bottom lever shown on the illustration is the motor control lever (directly under the speed control lever—the most convenient place for it) which starts, stops and reverses the spindle.

On work requiring frequent speed changes the Hole Wizard holds a tremendous advantage.



DIRECT READING
INSTANTANEOUS
Speed Control

THE AMERICAN TOOL WORKS COMPANY

Lathes Radials Shapers

CINCINNATI, OHIO, U.S.A.

940



SIMONDS

RED END HACK SAWS

Sure can take it



Apprenticeship and Execu at Mergenthaler Linc

In this article the author presents the methods used for many together with the modifications recently adopt

By GEORGE W. ALLISON, M.E., M.M.E.
Assistant Works Manager

THE principal product manufactured by the company referred to in the title is the typesetting machine known as the "Linotype." The construction of the machine includes hundreds of individual parts, each of which must perform its own individual function so that the machine as a whole may turn out the slug or line-of-type to the precision necessary to meet trade demands. This slug is composed of type metal which is cast in a permanent mold against typographic characters to form a line of type of the height, thickness, and length required for the job in hand. When cast, the line casting is ejected into a receiving galley.

The accuracy required is within a fraction of a thousandth of an inch, and when one realizes that the molten metal, prior to being pumped into the mold is at a temperature of approximately 550 deg. F., and is brought to solidifying temperature and ejected in less than ten seconds, then one may begin to understand the necessity for efficient and experienced mechanics to make this possible.

When one also realizes that the parts of the machine vary from castings weighing some hundreds of pounds to small parts weighing fractions of an ounce, the perfectly amazing functional balance of these parts is apparent. To the visiting engineer, and especially to the visiting layman, the almost human qualities of the Linotype machine, which does everything but talk, are a source of wonder.

There are many parts where manufacturing tolerances must be held to tenths and where 0.00025 in. variation would be cause for rejecting the part as unfit for use. Aside from its mechanical and typographic design reputation, the reputation of the company has been built upon manufacturing precision — which is internationally known. Obviously, this reputation must have been built up on two main points—equipment and personnel—and it is with the latter that we are particularly concerned in this article.

One of the most widely discussed topics in manufacturing circles is apprenticeship and junior executive training. It is unquestionably one of the most important problems of industry today and will be even more important in the future. Modern manufacturing methods, necessary as

Executive Training Methods Linotype Company

ed for many years by the Mergenthaler Linotype Company
cently adopted because of changing trends.

they are to permit more people to have more goods, do not produce the type of mechanic of yesterday. This is an age of specialization, which reflects itself in the type of mechanic generally turned out.

Very few men, comparatively speaking, can or will acquire the general all-round experience which was so prevalent a few years ago but which is so scarce today. While this is all right for simple parts manufacturing, it is necessary to have all-round trained men for erection, field work, tool work, and so on. The only way we can get such men is to have a well-planned, comprehensive training program in the fields involved, and this program is part of the responsibility of the company that needs such men. It is no longer possible to draw upon the general labor market for all-round mechanics; therefore they must be trained through suitable training courses.

Most companies had an apprenticeship course of some form or another prior to the depression, at which time many were drastically curtailed and in many cases discontinued in the interest of economy. This move was poor economy indeed, and the results are felt today in the severe shortage of trained men. On the surface the expense of training men is high, but it is well worth while and is the only source for such men.

Many years ago this company recognized the trend of a shrinking all-round mechanic market and laid its plans accordingly. General apprenticeship courses in toolmaking, patternmaking and tool designing were developed and have been in force for thirty years. We are reaping the benefits today because we have had a number of well-trained men coming along from which to draw and the comparatively few graduates that leave us invariably find good positions with other companies.

The trade is continually demanding increased versatility, greater range, increased output and greater accuracy, which necessitates the use of men with greater skill, not only in the plant but also in the field. Now, as never before, it is necessary for the company to make sure that properly trained men are available for such work.

Inasmuch as we are located in the New York metropolitan district and surrounded by almost every type of evening school, we find it advisable to leave scholastic training to these



Interviewing a candidate for the Mergenthaler Apprenticeship Course. Present, left to right, are Mr. C. A. Hanson, Vice President in Charge of Works; Mr. W. M. Mulroy, Personnel Manager; the candidate; Mr. A. E. Green, General Foreman of Assembly Division, and Mr. G. W. Allison, Assistant Works Manager.

schools. There are trade schools, evening technical high schools, engineering institutes and colleges available—some free and others charging tuition. Thus there is no reason why an apprentice cannot parallel his daily practical training with evening technical instruction leading to college undergraduate degrees and even "master's" and "doctor's" degrees. With such a splendid array of evening institutions available, it is considered better to devote the entire apprentice training to the practical shop aspects.

About a year ago the entire apprentice program was completely reviewed, in the light of changing trends, and the following general changes were made:

1. The entrance prerequisites were raised to a higher standard; i.e., graduation from a technical high school or its equivalent.

2. The wages paid were raised to attract young men who measure up to these higher standards.

3. Consultations were arranged with eminent educational authorities for the purpose of working out a program so that the school training would supplement the shop work.

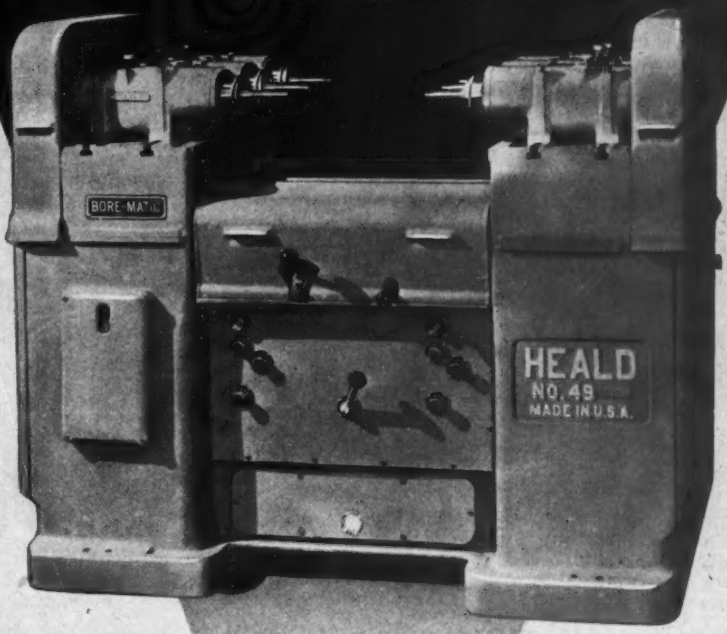
4. More comprehensive consultation and lecture periods were arranged with department heads so as to broaden the knowledge of the apprentices.

5. A new course in Linotype machine erection and operation was established, leading to a certificate of fitness as a Linotype machinist.

The theory behind the selection of a technical high school is that if a boy elects to go to such a school and completes the four years' course, he must have a natural inclination for mechanical work.

One of the difficulties inherent in the training given to our tool room apprentices is, paradoxically, due to the fact that our equipment is too modern as compared with many plants. For instance, in the making of a drill jig, the boring of the bushing holes is performed on Swiss jig borers by a specialist in this work; consequently, an apprentice must be taught other methods to fit him for work in less up-to-date plants, as he may desire to leave at the expiration of his apprentice period. In addition to his regular course we have, there-

In 1940: BORIZE



More precision, more production, more profit — that's what you get when you put those fussy finishing operations on Heald Bore-Matics and borize. You'll discover, as Bore-Matics already have proven in hundreds of installations, that meeting those tough tolerances is not so tough — that drooping production and profits can be quickly revived with this method.

Remember also, Heald Bore-Matics not only precision bore but precision face, turn, chamfer and do other operations individually or as many as required in the same setting.

You'll find that Heald Bore-Matics not only meet your requirements, but give you more in the kind of performance that spells quality and profits.

THE HEALD MACHINE COMPANY, WORCESTER, MASSACHUSETTS

HEALD

PRECISION BORING AND GRINDING MACHINES

fore, found it advisable to create hypothetical drill jig problems.

For example, each apprentice is required to take a block of cast iron, square it up, and lay out the position of the bushing holes with a height gage. He then must place toolmaker's buttons in position, swing it up and balance it on the face plate of a lathe, indicate the button and bore the bushing hole. This experience, in addition to his regular course, fits him to make a complete drill jig in any plant not having jig borers and applies equally well whether it is done on a lathe or a milling machine.

The apprentice training program may be divided into the four following courses, and we will take them up in that order:

1—Tool, die and gage makers
2—Pattern makers
3—Draftsmen and tool designers
4—Linotype machinist work

All applicants for apprenticeship must fill out a contract form which is first signed by the father or guardian of the boy and is then submitted to the special apprenticeship committee for the particular group involved. Upon approval by the committee, the boy is accepted on trial pending satisfactory progress during the trial period, after which he is accepted as a regular apprentice. The apprenticeship committee consists of the vice-president in charge of works, the assistant works manager, the general foreman of the particular group involved and the personnel manager. Thus it may be seen that this company considers apprentice selection as a management duty rather than something to be left to subordinates.

The general conditions of apprenticeship in all four groups are about the same. For the purpose of illustration we will take the toolmaker's apprenticeship form as an example and show the modification for the other group under their own headings.

Tool, Die and Gage Maker

a. Requirements.

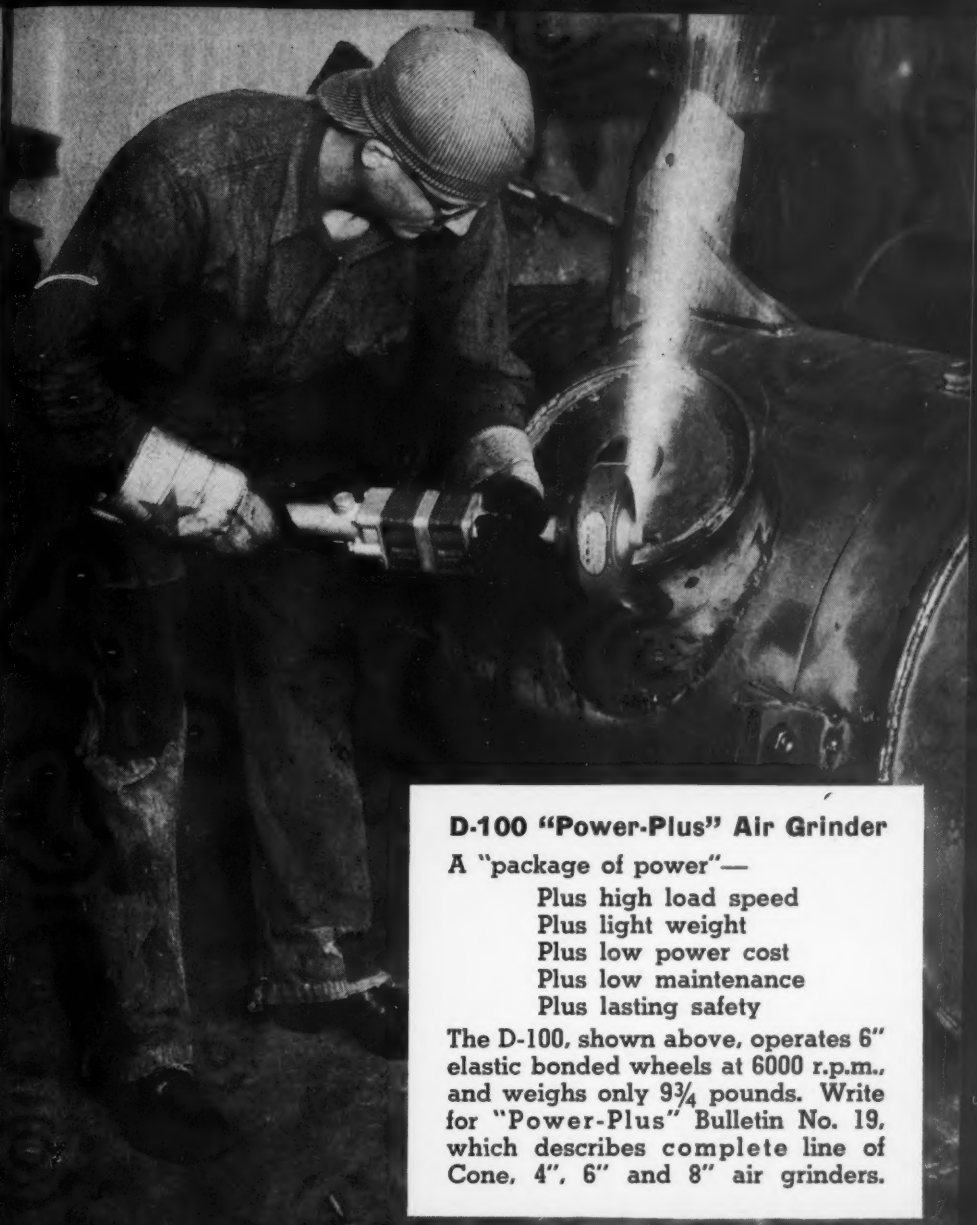
The applicant for admission to apprenticeship must be not less than eighteen years of age nor over twenty years. He must be physically sound, of good moral habits and have received a high school or technical school education. This must include algebra, trigonometry, plane geometry, mechanical drawing, and allied subjects, to the satisfaction of the apprentice committee.

b. Application and Agreement

The applicant must apply in person, and if this application is considered favorably by the apprentice committee, he will later be notified when to begin work, subject to the rules and regulations governing employees of this factory. In order that his special fitness may be judged correctly, the first 1,000 hours (about six months) is considered as a trial period. During this trial period he is paid at the same rate of wages allowed for the first period of apprenticeship. If, at the expiration of the trial period, his conduct and workmanship have been found satisfactory, he is engaged as a regular apprentice, to date as of the beginning of the trial period.

c. Term of Apprenticeship

The term of apprenticeship covers eight periods of 1,000 hours each, making in all about four years' time. The hourly wages are increased each period until at the beginning of the eighth period, the maximum is reached. The company further pays a bonus of a sum equal to 5 per cent of all wages that have been paid to the apprentice during his period of



D-100 "Power-Plus" Air Grinder

A "package of power"—

Plus high load speed
Plus light weight
Plus low power cost
Plus low maintenance
Plus lasting safety

The D-100, shown above, operates 6" elastic bonded wheels at 6000 r.p.m., and weighs only 9¾ pounds. Write for "Power-Plus" Bulletin No. 19, which describes complete line of Cone, 4", 6" and 8" air grinders.

ROTOR TOOL COMPANY

CLEVELAND, OHIO

THINK OF THESE NEW MACHINES IN TERMS OF MORE CAPACITY

When you buy a new Gisholt Turret Lathe, you buy increased production and greater accuracy—not just a machine. Of course, it gives you lower unit manufacturing costs—that's the result of faster, simpler operation. Many users of new Gisholts have increased production on certain parts as much as 40%, 50%, 60%—and even more. You, too, can increase your production by taking advantage of the new Speed Selector and other cost-cutting, time-saving improvements that have been incorporated in these new Gisholts.

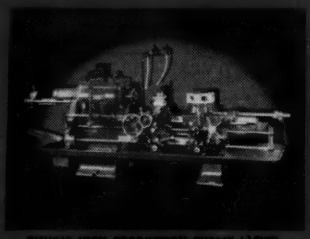
We'll be glad to tell you all about them.

"YOUR SMARTEST INVESTMENT TODAY—BETTER MACHINE TOOLS"

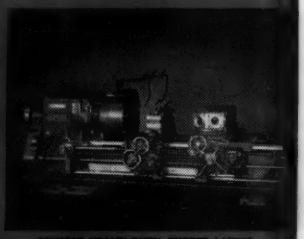




GISHOLT UNIVERSAL RAM TYPE TURRET LATHES



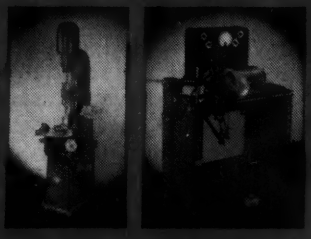
GISHOLT HIGH PRODUCTION TURRET LATHES



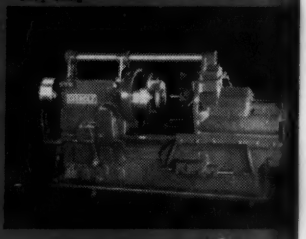
GISHOLT HEAVY-DUTY TURRET LATHES



GISHOLT NO. 12 AUTOMATIC PRODUCTION LATHES



GISHOLT BALANCING MACHINES



GISHOLT SHOPMATIC LATHES

GISHOLT

GISHOLT

MACHINE COMPANY

1219 EAST WASHINGTON AVENUE, MADISON, WISCONSIN, U. S. A.

TURRET LATHES · AUTOMATIC LATHES · TOOL GRINDERS · BALANCING MACHINES



Grouped here are the apprentices from the toolroom, pattern shop, engineering division, and assembly division, together with their supervisors and the apprenticeship committee.

apprenticeship and confers a diploma signed by the apprenticeship committee, for the company, if he satisfactorily completes the full course.

d. Record of the Course

Careful records are kept of each apprentice, including his efficiency, initiative, progress, obedience, attendance and so on. These reports are made out each month by the foremen and at the end of each quarter are sent to the father or guardian of the boy. If at the expiration of 6,500 hours the committee feels that the boy has exceptional ability, he is permitted to graduate with the same diploma as if he had completed the full 8,000 hours. This is his reward for exceptional aptitude and application.

e. Tools Furnished to Apprentice

During the term of his apprenticeship he is furnished with the following tools: One 1-in. micrometer, one 12-in. combination square set, one one-pound hammer, one 6-in. scale, one 8-in. monkey wrench, one 8-in. outside and one 6-in. inside calipers, one 6-in. divider, one 6-in. hermaphrodite, two center punches and one copy of "American Machinist's Handbook." These tools are loaned to the apprentice to become his property at the conclusion of his apprenticeship.

f. General Conditions

The company endeavors to give to the apprentice, as far as possible, an opportunity to acquire a practical knowledge of the trade, and it is expected that he will manifest an interest in this by being punctual in attendance, by good conduct and faithful work in the shop, and by improving himself in his leisure time through outside study and the reading of literature bearing upon his work.

The company reserves the right in its sole discretion to terminate the agreement and discharge the apprentice for any of the following reasons: Non-conformity to shop rules and regulations, lack of industry or capacity, indifference to duties, the

practice of vicious habits, or the continuance, after notice of their impropriety, of association with individuals deemed by the company detrimental to his welfare. However, no apprentice is discharged until after investigation and approval by his general foreman. After notice of such discharge he is entitled to a full hearing before the committee, whose decision is final.

The first month of the boy's apprenticeship is spent in the tool crib under the direct supervision of the tool crib attendant, who teaches the boy the names and uses of the various tools. He then spends about a year under the direct supervision of journeymen, making small tools and cutters. In this work he is instructed in the use and operation of engine lathes, milling machines, keyseaters and in bench work.

The next year the apprentice works in the machine repair division. During this time he is given instruction and assists in overhauling and repairing various machines used throughout the plant. In so doing he becomes familiar with the use of grinders, drill presses, lathes, planers, shapers, milling machines, and so on, together with such bench operations as scraping, fitting and assembling. The next year is spent in the jig and fixture division, where he is taught how to build drill jigs and various types of fixtures. Working under direct supervision of various journeymen, he absorbs the various individual technique acquired by these journeymen over many years of experience. Eventually he is given simple jigs and fixtures to build and, when sufficiently proficient, is given more and more complicated jobs.

The final year is spent in the die and gage division. At first he works as a helper to the various journeymen, but gradually is given more and more responsible work until he finally is permitted to make dies and gages. During his entire apprenticeship course he comes into contact with the various manufacturing departments in the trying out of tools and in the work of repairing machines.

Pattern Maker

The same general conditions apply, except that the apprentice is loaned the following tools, which become his property upon the satisfactory completion of his course: one 18-in. iron bench plane, one 6-in. block plane, one 12-in. combination square set, one 5-in. spring divider, one $\frac{1}{8}$-in. steel shrink rule, one $\frac{3}{16}$-in. steel shrink rule, one 6-in. scratch gage and one 10-in. sweep ratchet brace. The foreman first instructs the apprentice in the care and use of all machines used in this work and cautions him as to the hazards of their improper use. He is then carefully instructed in the use of the various hand tools and measuring gages, following which the foreman explains the theory and practical application of patterns such as draft, cores, core boxes, moulding practice, and metal shrinkage, after which he is permitted to watch the workmen and ask questions.

After the apprentice has become thoroughly familiar with his surroundings and tools, he is given a sketch or simple pattern drawing and is instructed as to the accuracy required and the practical methods of making this pattern. Before making the pattern, however, he watches and is instructed in the technique of making pattern castings and actually moulding same, so that he may be able to visualize the practical reasons for draft, cores, loose pieces, and so on.

When he has completed the first pattern, he must submit it for inspection in the same manner as a reg-

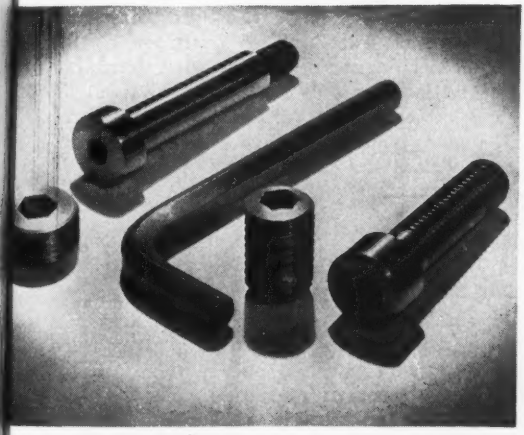
THE RESULTS OF A NEW AND SUPERIOR METHOD OF MANUFACTURING...PATENTED BY HOLO-KROME



HOLO-KROME FIBRO FORGED SCREWS

TRADE MARK

the Socket Screws that have "Everything"!



QUALITY . . . . . .

The exacting daily applications of Users prove the outstanding Quality of FIBRO FORGED Screws.

ACCURACY . . . . . .

Endless checking and gauging during manufacturing operations plus a final individual hand inspection Guarantees Holo-Krome Accuracy.

FINISH . . . . . .

The New Lustrous Black Finish—a definite feature of tremendous importance in Product Design.

The exclusive H-K method of TEN-TOR Testing Guarantees

UNFAILING PERFORMANCE

HOLO- FIBRO FORGED TRADE HK MARK SOCKET SCREWS **KROME**

THE HOLO-KROME SCREW CORP. HARTFORD, CONN., U. S. A.

British Representatives:

Geo. H. Alexander Machinery, Ltd. 82-84 Coleshill St., Birmingham

ular pattern. If he has made it correctly, he is given a more complicated pattern to make and from this time on is advanced by degrees until he is a proficient workman.

Machine and Tool Designer

The same general conditions apply except that—

a. He must be a graduate of a technical high school, such as Brooklyn Technical High School.

b. The requirements of graduation from a technical high school may be waived if he has had two years' experience in our tool room and has satisfactorily completed courses in algebra, geometry, trigonometry, electrical hook-ups, English, mechanical drawing, and so on, to the satisfaction of the apprentice committee.

c. During the term of apprenticeship, he is loaned the following equipment: one drafting set, one 8-in. 45 deg. triangle, one 9-in. 60 x 30 deg. triangle, one triangle box-wood scale and one "American Machinist's Handbook." These become his property upon satisfactory completion of the course.

Linotype Machinist

The same general conditions apply except that—

a. The requirements are the same as for machine and tool designer.

b. The term of apprenticeship consists of eight periods covering about five years' time. The first two periods (1,840 hours) are devoted to general sub-assembling; the third period (320 hours) is devoted to special sub-assembling; the fourth and fifth periods (1,840 hours) are devoted to sub-erection; the sixth period (2,000 hours) is devoted to sub-finishing, and the seventh and eighth periods are devoted to finishing, adjusting, inspection, and so on.

c. The tools loaned to the apprentice and which become his property at graduation are practically the same as for a tool maker.

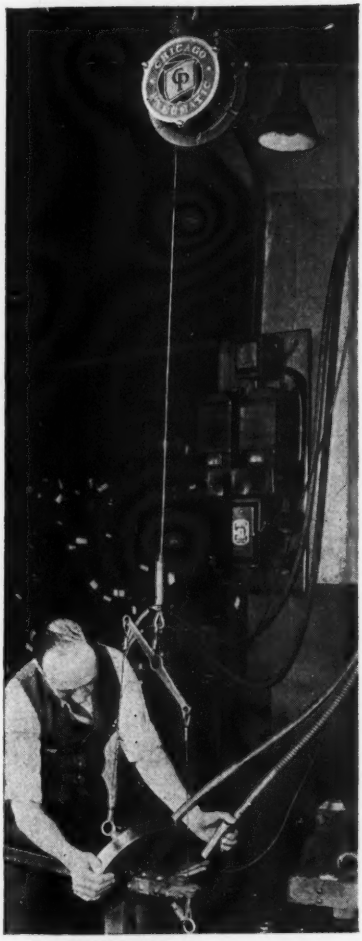
Completion of this course means that the apprentice has a thorough knowledge of all phases of Linotype construction and functions and fits him to go into the field as an expert craftsman.

It is from among these experts that men are selected to serve as company representatives in the field; some as erectors and servicemen, some as salesmen, and some as special factory representatives to assist in solving problems in the field. Many of these former Linotype experts are now factory executives. It is therefore necessary to see that only the highest type of young man is selected for training in this work, not only for his scholastic training but also for his potential executive capabilities and initiative.

One-half day each month is now set aside for the apprentices to meet and consult with the heads of the various divisions. All apprentices, regardless of which course they are taking, meet as a group with the chief engineer, head of assembling division, head of tool room, or head of pattern shop, who explains the various phases of the work in his division and invites questions regarding this work. This means that each apprentice meets with each of the above-named executives three times each year.

At all times the personnel manager acts as mentor to the apprentices. He inspects the report cards after they have been made out each month by the foremen and sends a record of this report to the parents of the boy at the end of each quarter. All apprentices are invited to consult with the personnel manager relative to personal troubles and difficulties in their work.

GET MORE PRODUCTION PER MAN HOUR



By balancing any type of portable tool, jig or fixture in its best working position — above a bench or on an assembly line — CP Super Safety Balancers eliminate operator fatigue and increase production. They are available in several sizes from 3 to 300 pounds capacity. Write for SP-1885.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices:
6 E. 44th ST., NEW YORK, N. Y.
Sales Offices and Service Stations Throughout the World

CP SUPER SAFETY BALANCER

Junior Executive Training

Some years ago the president of this company recognized the necessity of "backing up" each executive with youth so as to insure a continuity of executive calibre material. To this end a special executive training course was established some ten years ago, covering a complete practical training program in the internal organization methods and its relation to field requirements.

The following list indicates the type of men that were selected as the first group, and the diversity of their previous experience.

Two graduate mechanical engineers.

One graduate of a technical school who at that time was a subexecutive in the engineering department.

One factory-trained toolmaker with evening technical school training and who was also a finished Linotype craftsman.

Two factory assistant foremen.

One university graduate with a general academic background in the arts and sciences.

The selections were made on the basis of education and background, appearance, leadership ability, aptitude and previous training.

After completing the factory schedule, these men follow a prescribed course in the executive offices, where the business end of the company's activities are handled. Thorough training in the accounting, order, legal, domestic and overseas sales departments is given, to the end that the student may become familiar with the many details and methods used.

Upon completing his training in the executive offices, the student is assigned a position commensurate with his ability and bent.

Three of these men now comprise the highly important technical division which handles all liaison work between factory and customers, determines policies relative to complaints, disseminates mechanical information, and, in general, acts as a clearing house between the technical and business branches. Another of these men is head of the engineering department, while still another is associated with the vice-president in charge of sales.

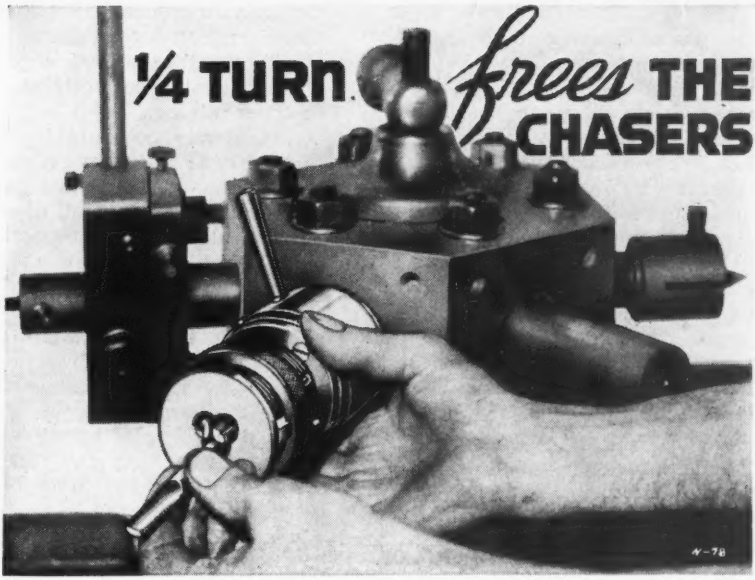
The factory training course period extends over a year and covers the following procedure:

Engineering Department	15 weeks
Production Department and General Stores	4 weeks
Purchasing Department	½ week
Personnel Department	1 week
Shipping Department	1 week
Sub-Assembly Department	4 weeks
Main Erecting Department	13 weeks
Electric Control and Heating Department	2 weeks
Matrix Manufacturing Department	14 weeks

Engineering Department

In this department all manufacturing data is prepared, but in reality it is more than an engineering department. When the research division has complete a new project and it has been approved for manufacture by the committee on changes and improvements, the entire project, consisting of drawings and other data, models, temporary tools and patterns, and so on is turned over to the chief engineer for processing. The manufacturing tolerance committee, consisting of representatives from both the engineering and research departments, goes over the drawings and applies manufacturing tolerances on each dimension, indicates those parts which can be purchased more economically than they can be made in the plant, and lays out a parts list showing all parts involved in the project.

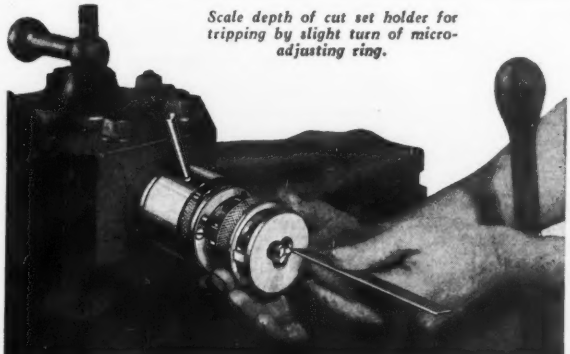
RICKERT-SHAFER



New COLLAPSIBLE "C" TAP . . .

QUICK SET-UP . . . LONGER CHASER LIFE

This collapsible tap features a micro-adjusting trip ring that permits fast accurate setup and snappy changing of chasers—a ¼ turn of the ring releases chasers. The same tap can be used for either stationary or live spindle work. Accurate threads are produced for the entire life of chasers—a visible adjustment on the holder permits compensation for chaser wear.



Scale depth of cut set holder for tripping by slight turn of micro-adjusting ring.

MADE IN 3 SIZES:

No. 2—9/16" to 11/16" — Straight Threads—⅜" Pipe.
No. 3 — 11/16" to 7/8" — Straight Threads—½" Pipe.
No. 4 — 7/8" to 1-1/8" — Straight Threads—¾" Pipe.

Write for details.

RICKERT-SHAFER CO.

612 W. 11th ST.
ERIE, PA.

DIE HEADS • TAPS
BORINGHEADS
THREADING MACHINES

This data is then turned over to the parts drafting division, where part numbers are applied for component parts and assembling, material specifications are applied and all other miscellaneous drafting room data are recorded, tracings are made of each part, an identification number is applied for the project, and then the whole job is sent to the planning division. This division, in connection with the factory foremen, lays out manufacturing operations, tools, gages, pattern, and so on and assigns each operation to the proper department and machine. All of this data is recorded on master record cards.

Orders for designing and making the manufacturing tools are then issued. These orders, after being approved by the engineering office, are sent to the tool designing division, and when the design is completed and approved, drawings are sent to the toolroom to have the tools built and tried out. The tools are tried out in the manufacturing department in which they are to be used and are then turned over to the foreman.

While the tools, patterns, gages, and so on are being built, the master record cards and other data are assembled and forwarded to the production department for the placing of production orders in accordance with manufacturing schedule, and to the accounting department for checking of the actual costs against the estimated costs.

As production orders are placed in the plant, the timestudy men, who are a part of the planning division, make studies and set the piece work rates. The reason for locating the timestudy men in the engineering department instead of the production department is to give them an opportunity to become more familiar with the way the jobs are planned and therefore can determine more efficiently whether or not a job is set up and running correctly at the time of timestudying.

The above procedure is the cycle through which the executive student passes; thus he acquires a rather extensive knowledge of all of the engineering phases of manufacturing as well as of practical manufacturing methods, tools, machines and inspection.

Production Department and General Stores

Here the student becomes familiar with scheduling of raw material and finished parts, placing of production orders, dispatching and following of these orders in the plant, inventory of parts on hand and in process, supply and general stores and filling of customer's orders for supplies or for complete Linotype equipment.

Purchasing Department

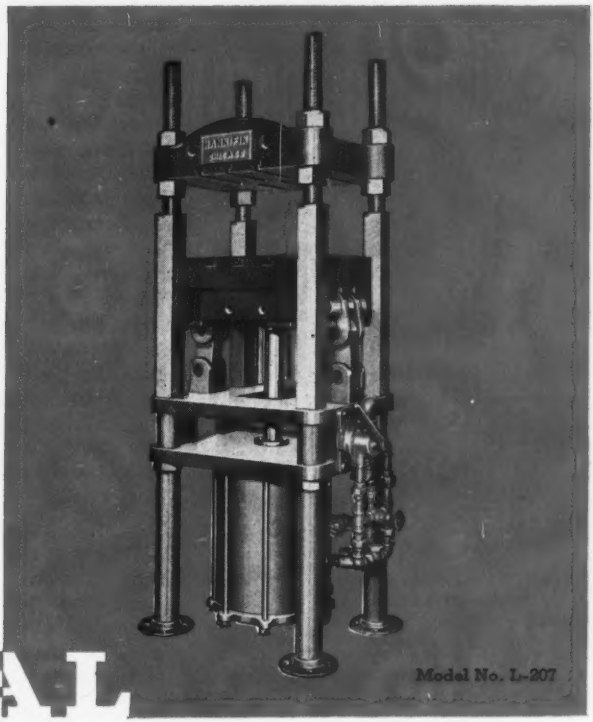
The student is made familiar with purchasing technique, the study of market conditions, and how and when to contract to take advantage of the market. He is taught the procedure of securing quotations, of placing and recording of purchase orders and following them until product is received, the checking of invoices and bills, and filing of filled orders, quotations and correspondence.

Personnel and Receiving Department

In this department the student is taught the technique of hiring employees and the keeping of records for each employee, such as personnel records, insurance, attendance records, check-up of references, and so on. He also learns the procedure involved in receiving purchased materials and checking the materials against purchase orders.

Shipping Department

After a machine has been com-



Model No. L-207

Specifications:

Model No. L-207—Capacity 50 tons at 80 lbs. sq. in. line pressure. Between columns 22 in. Daylight, minimum, platen down 17½ in., platen up 9½ in. Advance speed six times pressing speed. Cushioned reversal at full power. Adjustable speed control provided in each direction. 50 tons capacity developed at ⅛" from end of platen stroke.

Also available in 15 ton capacity.

IDEAL

FOR MANY MOULDING, PUNCHING, OR PRESSING OPERATIONS • • •

This compact air operated platen press, available in 15 ton and 50 ton sizes, provides flexible and unusually economical production facilities adapted to many different types of work involving the application of pressure. Since it is air operated, this press is compact and comparatively light in weight. The air supply at 80 to 100 lbs. pressure is already available in most plants. Multiple unit installations provide for convenient, rapid handling of successive moulding or pressing operations, or for increased capacity, without excessive investment. One operator efficiently handles as many as five presses on many types of work.

The fast operating cycle includes a rapid advance stroke, short power stroke, and full power to open moulds on the return stroke. Speeds in either direction may be regulated to suit individual needs.

Hannifin air operated platen presses are being used for a wide range of work, including punching or blanking with steel rule dies; multiple pressing operations; rubber moulding; plastic moulding (hot and cold); perforating; piercing; cutting shapes from sheet or strip stock.

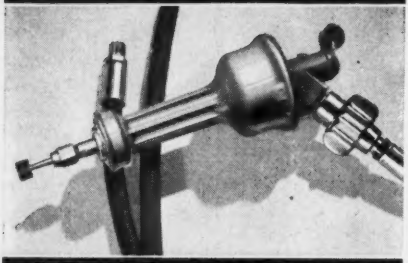
Hannifin engineers will gladly make recommendations to meet your individual needs on receipt of specifications.

HANNIFIN MANUFACTURING COMPANY • 621-631 S. Kolmar Avenue, Chicago, Illinois

HANNIFIN *air operated* PLATEN PRESS

ENGINEERS • DESIGNERS • MANUFACTURERS • ***Pneumatic and Hydraulic Production Tool Equipment***

TRY THIS SENSATIONAL KIPP air GRINDER



AT NO EXPENSE
Special 10-Day Trial
PROVES ITS SAVINGS!

This FREE trial offer permits any concern, with a satisfactory credit rating, to try out any Kipp Air Tool for ten days. There are grinders ranging in price from $9.75 to $58.75, Chippers and Filers at $19.75. The BB Grinder shown above is now only $25! Kipp Air Tools give you highest speeds, lowest prices—and are proving indispensable in hundreds of tool rooms and production departments. New catalog gives details.



Mirror Finish Tips . . just what the name implies for mirror-like finishing work.



Grinding Wheels . . . superb quality recommended for use with Kipp Grinders.

FREE TEN-DAY TRIAL
FREE CATALOG



☐ Send Kipp Air Grinder Model BB on your 10 day Free Trial Offer!
☐ Send the New Kipp Air Tool Catalog!

Name_____
Company_____
Address_____

MADISON-KIPP CORPORATION
208 WAUBESA ST., MADISON, WIS., U. S. A.

pleted and inspected to a customer's specifications, it is just as important to see that it gets to its destination as quickly as possible. This shipping procedure, however, involves dismantling and packing according to one of several different methods, depending upon whether the machine is for a local office, distant domestic office (by rail or by boat) or for foreign shipment. Credit releases are required prior to shipment, and transportation routes must be determined; also transportation damage claims must be handled in the event of accident in transit, and followed up in the event goods are lost or delayed. The student is instructed in this technique and actually participates in this work.

Sub-Assembly Department

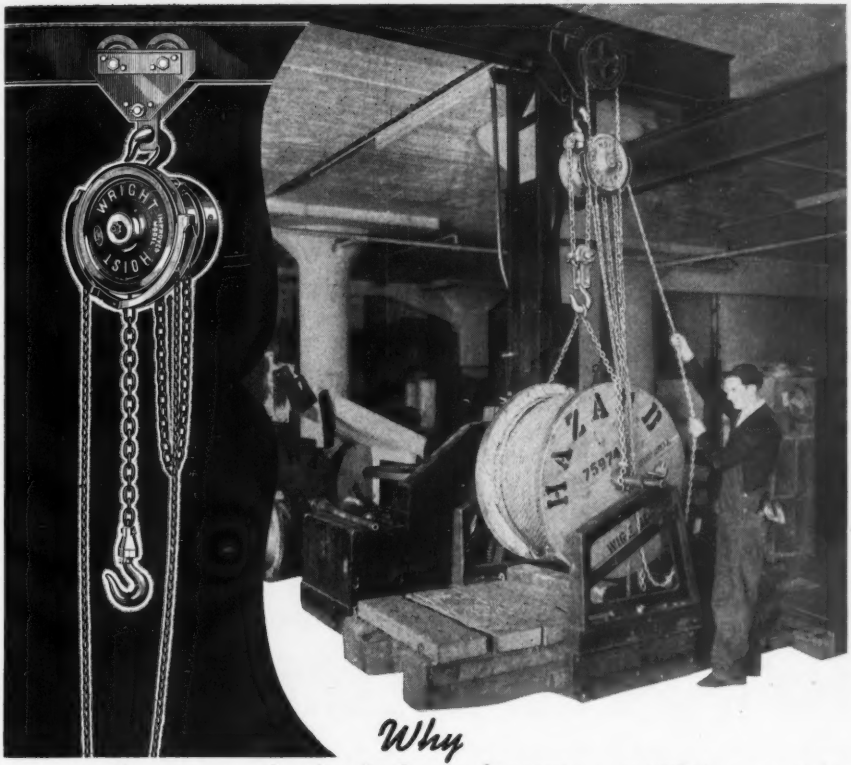
Here the student is required to actually assemble units and test the completed jobs, in the course of which he obtains a complete knowledge of the function of the various components.

Main Assembly Department

This is the department where the Linotype is completely erected and tested. Each student is required to perform the erection operations under direction of master workmen who are Linotype experts. After the machine has been erected, it is given a rigid inspection test and finally is turned over to prooftakers who are Linotype operators. Prooftaking consists of actually setting type under conditions much more severe than those encountered in the field, taking a proof of the type set, and preserving a copy of such printed proof for future reference. Thus the student acquires a working knowledge of field conditions.

Electric Control and Heating Department

The Linotype pot, in which the



Why

WRIGHT *Improved High Speed* HOISTS are RIGHT for your jobs

● They're right because Wright Hoists in their various sizes are built to take actual operating conditions just as they come.

Hoists in real industrial work encounter atmospheres that bring most products to time. They meet dampness, dust and grit, heat and cold, corrosive substances in the forms of gases, solids and liquids.

Wright meets them. It is prepared: first, by a full zinc coating of all parts: second, by a perfect sealing and lubrication; third, by an internal design that combines well engineered provisions for efficiency with adaptation to operating requirements.

The Wright Hoist has 21 real points of superiority. Some of these are most valuable on some jobs. All are valuable on all jobs. The Wright Catalog tells the story. Send for it.

BUY ACCO QUALITY *in Wright Hoists, Cranes and Trolleys, Tru-Lay Preformed Wire Rope, Reading-Pratt & Cady Valves, Campbell Abrasive Cutting Machines, American Chains, Page Welding Electrodes and Page Wire Fence.*

WRIGHT MANUFACTURING DIVISION • York, Pennsylvania

AMERICAN CHAIN & CABLE COMPANY, Inc.

AMERICAN CHAIN DIVISION • AMERICAN CABLE DIVISION • ANDREW C. CAMPBELL DIVISION • FORD CHAIN BLOCK DIVISION • HAZARD WIRE ROPE DIVISION • HIGHLAND IRON AND STEEL DIVISION • MANLEY MANUFACTURING DIVISION • OWEN SILENT SPRING COMPANY, INC. • PAGE STEEL AND WIRE DIVISION • READING-PRATT & CADY DIVISION • READING STEEL CASTING DIVISION • WRIGHT MANUFACTURING DIVISION • IN CANADA: DOMINION CHAIN COMPANY, LTD. • IN ENGLAND: BRITISH VVIRE PRODUCTS, LTD. • THE PARSONS CHAIN COMPANY, LTD. • *In Business for Your Safety*

type metal is melted, is generally heated by gas or electricity, the temperature of the type metal being controlled by means of a thermostat. The prime mover of the Linotype machine in the majority of cases is an electric motor. The student, by observation and actual work, acquired a working knowledge of electrical motors and resistance circuits as well as the heating value of gas.

Matrix Department

The matrices in which are the typographic characters mentioned before are cut are produced in this department. It is the assembling of these matrices which, when the type metal is cast against them, forms a line of type. The matrices are made to extreme limits of accuracy, but the manufacturing is necessarily performed by mass production methods, as several millions are produced each month, each with its own individual character, and in scores of different languages, type designs and sizes. The student, through observation and operation of the machinery and instruments, becomes well versed in this type of equipment by the time he has completed the operating course and also has a comprehensive knowledge of type design, type legibility and other type characteristics.

Conclusion: Apprentice and executive training, which in the past has not been given the attention it deserves, has now become a vital necessity and it behooves serious thought on the part of all concerned.

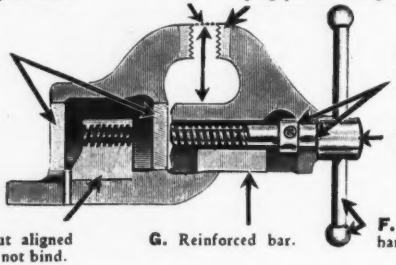
Barnes Gear Pumps PA-20 Series. Improvements, tooth structure, performance data, and specifications of Barnes Gear Pumps PA-20 Series are given in a four-page illustrated bulletin issued by John S. Barnes Corporation, Rockford, Ill. Copy free upon request.

The A-B-C's of HOLLANDS VISES

B. Liberal depth of jaw gives ample capacity for work within range of size.

C. Welded tool steel jaw faces, machine corrugated, cover entire face and will not loosen or lose their gripping power during life of vise.

A. Wide bearings and long body construction insure rigidity and durability.



D. Large machine finished bearings between screw head and collar prevent lost motion.

E. Electric welded steel heads.

F. Polished steel handle and handle balls.

G. Reinforced bar.

H. Heavy malleable nut aligned and fitted so screws will not bind.

Write for catalog which gives detailed specifications on the complete line of HOLLANDS VISES.

HOLLANDS MFG. CO. • Erie, Pa.



A WORKMAN FEELS THE DIFFERENCE

THE exclusive, *patented* type of serrated tooth construction of a Nicholson double-cut file is a microscopic thing. But when you get right down to it, it becomes a tremendous thing in the results it achieves.

"It's got bite!" Its irregular tooth serrations not only provide a sharp original cutting edge, but bring up fresh cutting edges as their predecessors wear down.

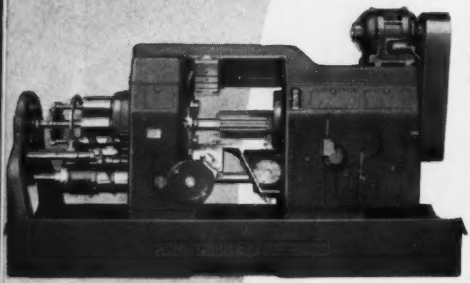
Result: Faster filing; longer, efficient file life—more effective strokes per file—more work per workman—more filing production at less cost.

But there's still more to Nicholson superiority: High quality so uniformly maintained—through rigid control and inspection at every stage of production—that Nicholson can promise "*Twelve perfect files in every dozen.*"

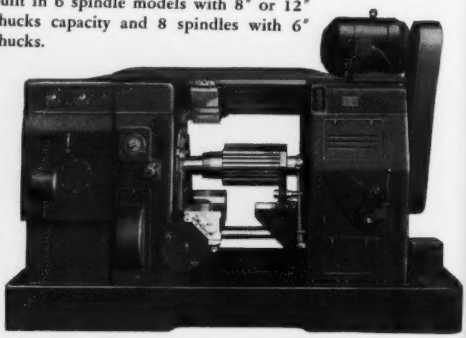
NICHOLSON FILE COMPANY, Providence, R. I.
Canadian Plant, Port Hope, Ont.

NICHOLSON FILES
FOR EVERY PURPOSE
NICHOLSON U.S.A.

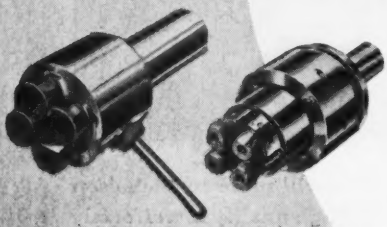
Modernize for Broader P



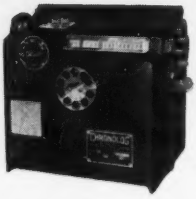
Acme-Gridley Chucking Automatics are built in 6 spindle models with 8″ or 12″ chucks capacity and 8 spindles with 6″ chucks.



Acme-Gridley Model RA Bar Automatics are built with 4-6 and 8 spindles in sizes 9/16″ to 4¾″



Namco Circular Chaser Self Opening Dies and Collapsing Taps—favored tools for production threading jobs on stationary and revolving spindle machines. Circular chasers give you 10 TIMES the life of ordinary kinds. Equipped with hollow milling cutters, Namco Dies become double duty tools.



The Chronolog — shows why, when and how long any equipment is idle and gives an accumulated count of units produced. Increase production more than 10% and is welcomed by operators.

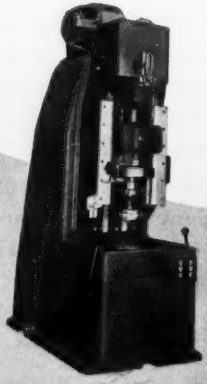


Snap-Lock Limit Switch adopted as standard by many machine tool builders as the most dependable switch ever used for both light and heavy duty normal circuit work.



Positive Centrifuge—for oil reconditioning, quickly pays for itself by protecting machine life and in cost savings for cutting, quenching, hydraulic and soluble oils.

Vertical Tapping and Boring Machines for work 2″ to 4½″, features an indexing work holding chuck which results in positive alignment of taper threads with high accuracy at record speeds.



...er Profit Horizons in 1940 1941 1942 1943

Yes, business is good! You may be among those who say that neither today nor this new year perhaps, will you need to worry about keeping your milled-from-the-bar and chucking machine equipment busy.

Busy... but at what PROFIT?

This we know: many National Acme customers who *a year ago* took steps to MODERNIZE with new model Acme-Gridley Multiple Spindle Automatics are today reaping the *highest profit* returns on their bar and chucking machine production.

Why?

... because these remarkable multiple spindle automatics are consistently 20 to 100% faster than any bar or chucking machines that are 5 to 10 years old.

... because Acme-Gridley automatics stay accurate, even when faster feeds and higher spindle speeds push output to the limits that cutting tools can safely stand.

When the rush is over... what PROFIT?

Business horizons beyond 1940 are not foreseen. But again we can be certain that leaner cycles are ahead ... as inevitable as the sun. Then, every worthwhile order will be fought for on a strictly price-quality basis. In production shops where the cost of bar cut parts and chucking work are vital factors in competitive selling, this same Acme-Gridley combination of speed, adaptability and stamina will *continue* to produce at lowest costs ... will insure your profit horizons for the years ahead.

So, if you haven't recently compared...

Check today's Acme-Gridley performance and cost figures with those from your present equipment. Let our engineers help you make these comparisons *now*. Get ready ... *insure* your profit horizon for the years ahead, regardless of your profit position today.

WE ARE PLEDGED
TO THIS FORWARD-LOOKING PLAN

This company will, as far as is humanly possible, continue loyally to meet the modernization requirements of OUR GOVERNMENT and of old customers. And, with steadily increasing facilities in men, machinery and materials at our ten-acre Cleveland plant, we will also continue to solicit and make every reasonable effort to serve the future needs of other modernization-minded plants

◆ ◆ ◆



NATIONAL ACME

170 EAST 131ST STREET • CLEVELAND, O.

ACME-GRIDLEY 4-6 AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS • SINGLE SPINDLE AUTOMATICS • AUTOMATIC THREADING DIES AND TAPS • SCREW MACHINE PRODUCTS • THE CHRONOLOG • LIMIT SWITCHES • POSITIVE CENTRIFUGE • CONTRACT MANUFACTURING

Practical Heat Treating

In this article, the third of the series, the author deals with the design and heat treatment of high speed steel tools.

By Frederick Taylor Potter

INASMUCH as carbon or alloy tool steels exist for nearly every conceivable purpose, any attempt to cover all of them in one article would make it so general as to be of little practical value. Since, however, the majority of such steels fall naturally into groups which are treated in much the same ways, descriptions of the treatments applied to the principal ones will give the reader a good background from which to work.

A plain carbon steel is one in which no great amount of any element other than carbon is added to influence its characteristics. Manganese, phosphorous, and sulphur traces of the rest, with the exception of iron, of course, are incidental and rather unimportant. Such a steel, with low carbon (SAE 1020), is of the following composition: carbon .15 — .25, manganese .30 — .60, phosphorous .045 maximum, and sulphur .055 maximum. A steel of such characteristics is commonly known as "cold rolled."

An example of a somewhat similar steel, of low carbon but with sufficient addition of other elements to bring it into the alloy class, is SAE X1315; carbon .10 — .20, manganese 1.30 — 1.60, phosphorous .045 maximum, and sulphur .075 — .15. This steel is too low in carbon to harden perceptibly upon heating and quenching and so must be carburized, for which, as a matter of fact, it is particularly designed. The high manganese gives it the ability to harden well in an oil quench with a comparatively small amount of distortion, as would be the case with a non-deforming tool steel. The high sulphur content indicates that it is designed for free machining.

As the carbon is increased, response to hardening follows until, with a .50 carbon material, hardness of 55 to 60 Rockwell C can be obtained after a water quench. With a steel having 1.0 carbon, readings of 63 to 66 Rockwell C can be expected, indicating that the steel is hard enough for most machine part or jig and fixture purposes. For special applications, such as high grade cutlery or files, the carbon may be increased as high as 1.40 or more, giving the steel the ability to hold a hard, fine edge. For general use as mentioned above, a steel with .90 to 1.05 carbon, such as S.A.E. 1095, will be quite adequate as a water hardening material.

The design of carbon steel parts, tools or dies will have a great influence on the success of the hardener. Breakage and distortion, his main difficulties, can be minimized by care on the drawing board. Two points of design in particular should be watched; sharp shoulders and undercuts in cylindrical pieces, and great differences in thickness of adjacent sections. Fig.

1 shows a 1½-in. drill bushing which failed in hardening because of a combination of both. A successful replacement was made by reducing the thickness of the collar and increasing the wall by reducing the thickness of the wall of the liner. A slight fillet was also left under the head and allowance was made for it by chamfering the bore of the liner a little.

When the reason for this breakage is understood, it can be corrected in most cases by design. If this is not possible, a skillful hardener can in many cases make the best of a bad situation. It is clear that two pieces of metal of different sizes will cool and contract at different rates when quenched. When the two are combined in one having areas of different thickness, the strains imposed by differences in contraction become enormous. If the material is strong enough to stand them, it merely warps. If not, it breaks.

There are many cases where winding a part or plugging a hole with moistened asbestos packing will lessen the chance of trouble. In the wet state, this packing is quite plastic and will stay fairly well where placed, or it may easily be held in place with an iron wire binding. If the bushing in Fig. 1 had been wrapped just below the head where hardness on the outside was not essential, the rate of cooling of that section would have been retarded so that it might not have cracked. When drilled or tapped holes are located near the edge of a part, a plug of asbestos will frequently prevent the holes from breaking out. This material may be used in many other ways which will occur to the heat treater in the course of his work.

The heat treater has plenty of worries without including among them the design of the parts he handles, but it is in the design that many of his troubles start. Even given a generous amount of luck, when the work consists of irregular-shaped pieces he is going to lose a certain proportion of them because of conditions within the piece which are beyond his control. The draftsman and tool designer should understand the nature of their

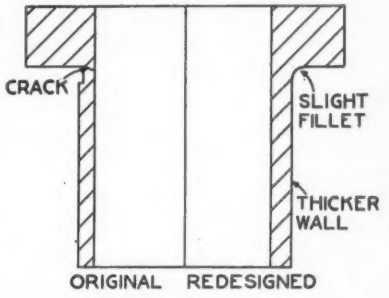


Fig. 1 — (Left) Original Design of Bushing Which Cracked in Hardening. (Right) After Redesigning to Provide Thicker Wall and Fillet

materials and should give the hardener every break possible by simplifying shapes, rounding corners and keeping sections uniform wherever possible. When this cannot be done, the hardener will have to depend upon experience to develop his technique—and this is expensive.

While distortion is nearly always present to some degree in a hardened piece, the toolmaker will occasionally save hours of work on an expensive die and have it come from the hardening in practically perfect condition if, given a proper design, he uses a so-called non-deforming steel of the so-called "plain carbon" type containing .90-1.00 carbon and 1.00-1.50 manganese. This steel must be oil-quenched to avoid probable cracking. The high manganese, as in the case of the X1315, enables it to harden satisfactorily in oil which, in turn, reduces distortion. Other non-deform-

ing tool steels are highly alloyed and may contain chromium, tungsten and vanadium in different combinations.

The toolmaker is frequently confronted by difficulties in machining tool steels due to their hardness, while in the production of quantities of tool steel parts such as textile spindles it becomes very important. Annealing is generally used as a broad term to indicate heating and slow cooling for such purposes as strain relief and better machinability, but its more specific use necessitates dividing it into several kinds of treatments.

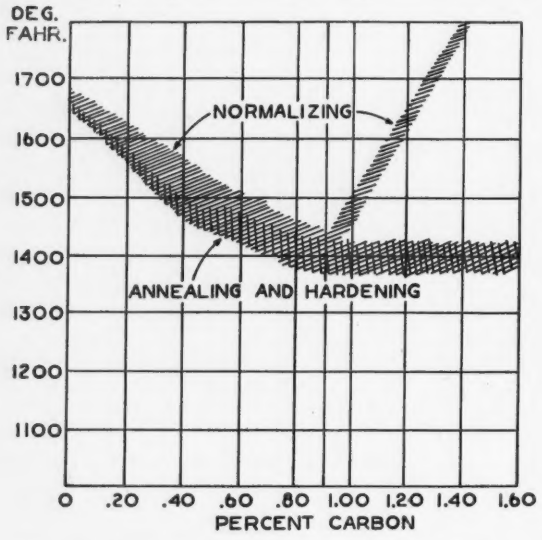


Fig. 2—Development of Iron-Carbon Diagram Indicating Processing Temperatures

Normalizing to relieve strains in SAE 1095 forgings requires heating to 1,550-1,650 deg. F. and slow cooling. Annealing for machinability requires 1,400-1,420 deg. F., while for a "spheroidized anneal," 1,300 deg. F. is about right. Both must be cooled slowly, while for all treatments of this class the work should be thoroughly soaked at temperature.

The work should also be packed in cast iron borings or spent carburizer in sealed containers with covers to hold the material in place. This will allow the containers to be removed from the furnace and cooled without further covering and, in addition, will prevent contact with air and consequent oxidation which might prevent proper hardening later. It is recommended that, in addition to forgings, delicate tools or dies made from the bar be given the normalizing treatment before hardening, to remove machining strains and reduce warpage.

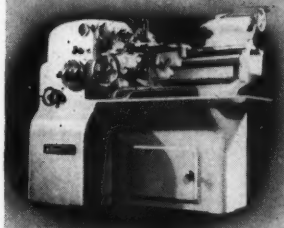
For maximum machinability the anneal called "spheroidizing" is used, so-called because the spheroidal condition in which it leaves the grains of the steel offers the least possible resistance to cutting. The process consists of holding the heat at about 100 deg. F. below the critical range for at least six hours for every inch of work cross section. The work should be packed and slow-cooled as in the other annealing operations. This treatment will give surprising results on steels which are otherwise very difficult to handle.

The chart Fig. 2 is a development of the Iron-Carbon Diagram which indicates the approximate temperatures required for these and the following treatments on plain carbon steels of varying carbon content.

Proper equipment has, as usual, a lot to do with success. The furnace should be large enough to accommodate the work without its coming in contact with the sides of the muf-

PRECISION maintained!



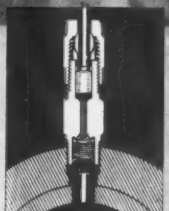


"MONARCH" LATHE—Metered feed to ways, cross slide, apron bearings . . .

● **High standards of machine accuracy, versatility and speed become of maximum value only when they are MAINTAINED. Bijur-lubricated machines are protected for life! Bearings, slides, gears . . . to each Bijur-fed part goes the metered oil-film it individually needs. Automatically! For a day's bigger output of higher quality work . . . for savings on maintenance . . . standardize on BIJUR.**

BIJUR LUBRICATING CORPORATION, Long Island City, New York

1330



The correct oil film to each individual bearing... *automatically*

BIJUR

AUTOMATICALLY *Correct* LUBRICATION

fle or chamber and preferably should leave several inches to spare all around. Whether gas, oil or electricity is used, automatic control is desirable because of the accuracy with which the temperature must be held for processing tool steels.

If any large quantity of work is to be done, recording instruments are worth the extra expense because of the recording feature and the more precise control of temperature available. Although tons of tools are hardened annually in oil, the author feels that electricity and gas have their advantages because of the accuracy with which electricity can be controlled and because gas is not only subject to almost as good control but also provides a protective atmosphere which is very helpful.

In the electric field is the oven-type furnace with a "gas curtain" at the door which is quite effective in preventing oxygen from entering the chamber. This type of furnace is widely used, and with satisfaction. The curtain valves are so arranged that, when the door is opened, the flame is automatically increased in size so as to completely cover it. By setting the automatic gas controls properly, the user may provide the exact atmosphere condition he desires; decarburizing, neutral or oxidizing. Once the valve is adjusted, the mixture will be correctly proportioned at any volume.

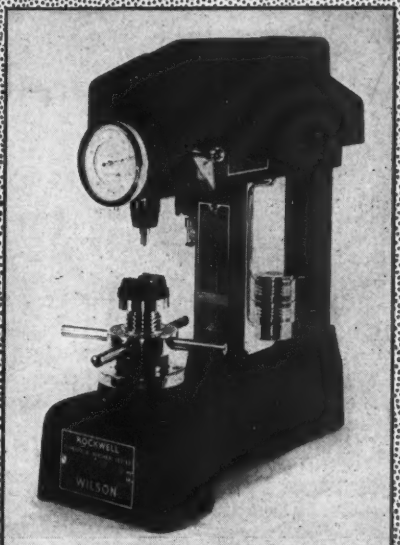
Another excellent electric unit, built in the vertical type, includes a separate small furnace to provide the required atmosphere. This is done by the breaking down of a special oil to form a gas which is led into the furnace where it gives the required protection to the steel. Its action may easily be regulated from highly carburizing to neutral and, since the furnace is thoroughly sealed against entrance of air, the results obtained are excellent. This furnace is also provided with a special type of temperature regulation which governs the speed of heating of the chamber with relation to the rate of heating of the work.

In heating a tool having both light and heavy sections, the controls automatically slow the heat input so that the thick and thin parts are brought up at approximately the same rate. This is important in reducing distortion and breakage, which frequently result when such a piece is heated too rapidly. In such a case, the thin sections may be in or through the critical range of temperature while the heavier ones have not yet reached it. Trouble is an almost certain result of quenching in this condition. A chart record shows when the work has reached the critical range, which is an aid to proper quenching temperatures.

While on the subject of quenching temperatures, it might be well to mention that the old magnet test is still useful at times in checking instruments. When the magnet no longer attracts the steel, the tool has reached the lower critical temperature. Allowing a short time beyond this point as the temperature continues to rise will ensure thorough heating of the tool before quenching. Due to its greater power, a magnet of one of the new alloys, such as Alnico, will be found easier to use than one of the more common type.

In using gas or oil furnaces for tools, satisfactory work can be done in the open or oven type, but care must be taken that the flame does not impinge directly on the work. The operator should be careful to run his furnace with an excess of fuel, allowing considerable flame to issue from the ports and door in order to pro-

"ROCKWELL"
Superficial
HARDNESS TESTER



FOR THIN OR SURFACE HARDENED METAL

WILSON
MECHANICAL INSTRUMENT CO. INC.
Concord Avenue, N. Y. City

vide a reducing and non-scaling atmosphere. Better for steady production, however, is the muffle type, which provides complete protection from flame impingement and reduces the importance of combustion atmosphere, since none of it enters the muffle except through its slightly porous walls. It is still desirable to keep the mixture rich in fuel to prevent any excess air from seeping through. It is necessary to keep the door closed

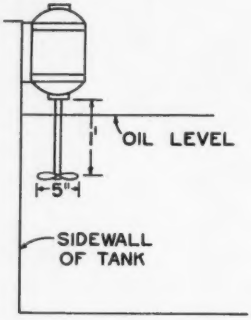


Fig. 3—Design of Agitator for Quenching Tank

when using such a unit unless it is equipped with a gas curtain such as that mentioned in connection with the electric type. The protective atmosphere inherent in the gas muffle furnace makes it especially adaptable for carbon tool steel work, although the vertical electric type is also very good.

The quench tank for tool work requires nothing unusual in design. For water, a tank large enough so that the water will not become hot and provided with a good flow of water will suffice, even on heavy work. For oil quenching, the tank size is more important, since the heat will be carried off more slowly and a larger volume of quench is needed. A tank 4 x 4 x 4 ft. will do for quenching drop forge die blocks weighing several hundred pounds at intervals of five or six hours if the oil is well agitated. A practical device for this purpose is shown in Fig. 3. If there is so much work that the temperature cannot be kept down to 150 deg. F., it will be wise to install a pump and cooler as described in previous articles in this series.

Since the hardener will have to learn most of his quenching technique by experience, due to the vast number of parts or tools and the fact that each presents its own problems, a few general rules are all that will be offered. Pieces with both light and heavy sections are best quenched at the heavy end first, ensuring longer immersion at the thicker end and tending to bring the whole piece through the critical range at the same time, thus reducing the tendency to strain and breakage.

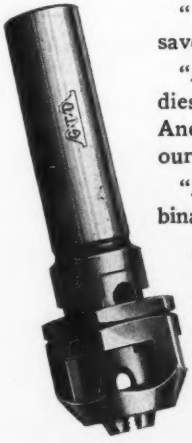
Long, slender sections should be plunged in vertically and moved up and down—not sideways—until cool. In some cases it will be found better to roll them into the tank horizontally by arranging a chute as illustrated in Fig. 4. The work is removed from the furnace, placed horizontally on the notched arms, and the arms are immediately tripped, precipitating the work into the quench spinning.

Very small tool steel parts except those having characteristics similar to those described above may be quenched without much particular attention except to one other point, and this also applies to the large ones. Don't expect uniformly good results from oil hardening steel quenched in water, and vice versa. There may be occasional applications that turn out satisfactorily, but breakage on one hand or soft work on the other will dog your steps if you persist.

Tempering may be done in salt pots,



Saved by "ACORN DIES"



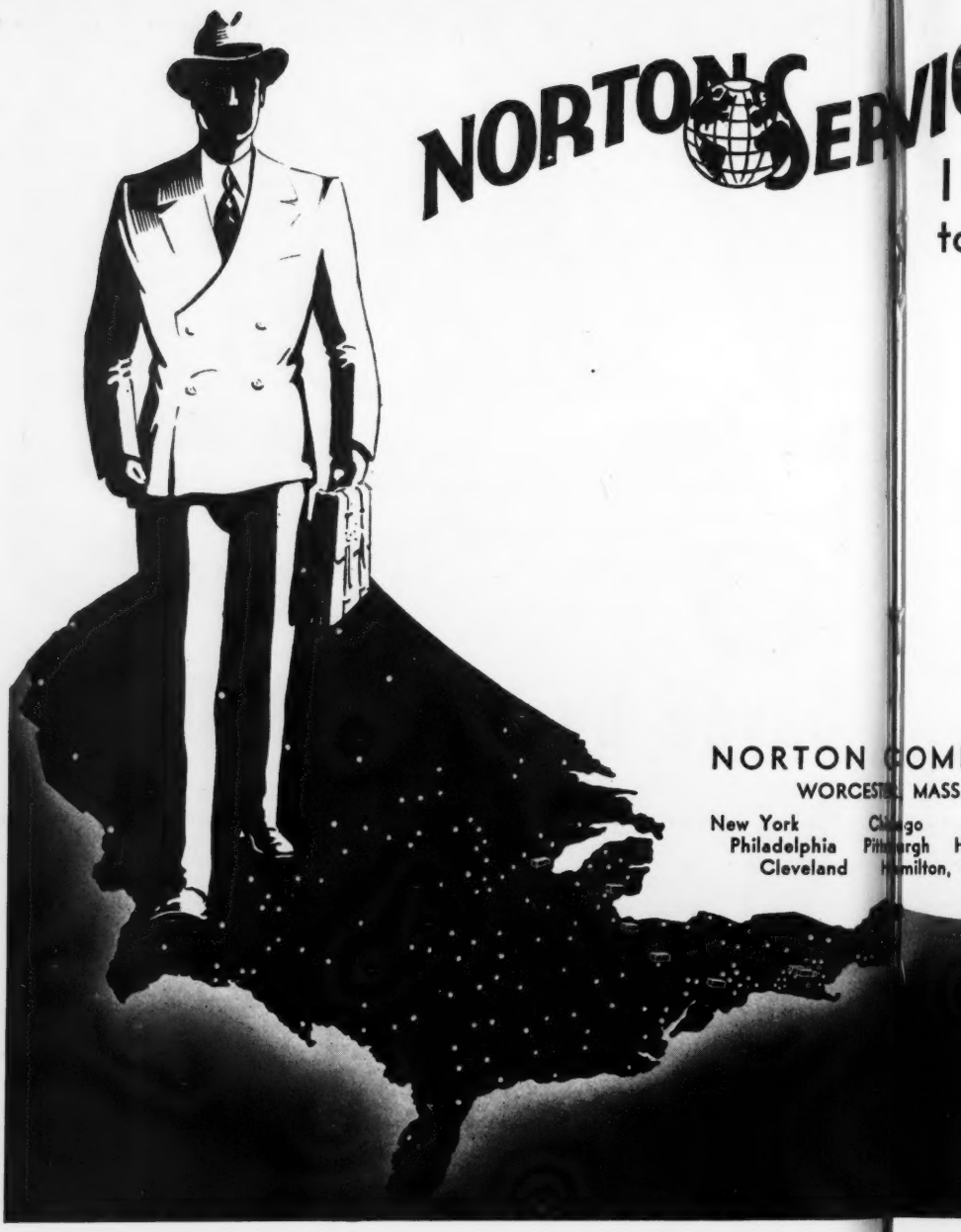
"'Acorn' Dies and *'Greenfield'* service licked a tough job and saved my neck at the front office," says this Detroit foreman.

"A new heat treatment on 3/32 studs was too much for our dies till a *'Greenfield'* man suggested High Speed 'Acorn' Dies. And what's more—he delivered them in three hours. We handled our 5,000 motors with the very first die. Some job!"

"Acorn" Dies and *"Greenfield"* service is an unbeatable combination. You, too, can benefit by it.

GREENFIELD TAP & DIE CORPORATION • Greenfield, Mass.
Detroit Plant: 2102 West Fort St.
Warehouses in New York, Chicago, Los Angeles and San Francisco
In Canada: Greenfield Tap & Die Corp. of Canada, Ltd., Galt, Ont.

GTD GREENFIELD


NORTON SERVI
I
to
NORTON COM
WORCEST MASS
New York
Philadelphia
Cleveland
Chicago
Pittsburgh
Hamilton,

ERVICE

1800 CONSULTANTS
to Help Solve Your Grinding Problems

THESE experienced representatives of Norton distributors work out of 150 cities.

Backed by a competent Norton field staff operating from over 25 industrial centers.

Backed by special field engineers — each an expert in a particular type of grinding.

Backed by extensive files of data on every type of grinding job.

This is Norton Consulting Engineering Service—an organization that can be depended on to solve your grinding problems.

ON COMPANY
RCESTER, MASS.
Chicago Detroit
Pittsburgh Hartford
d Hamilton, Ont.

NORTON ABRASIVES

W-738

particularly if only certain areas are to be drawn, or in electric or fuel-fired furnaces of the plain oven or recirculating types. The recirculating type, heated by either means, is the most convenient because it is quick heating, its temperature may be rapidly shifted for different jobs, and it will turn out work of maximum uniformity. It is also the best for large production.

If possible the tool steel should be kept from becoming really cold between quenching and tempering. If it cannot be tempered at once, it should be kept up around 200 deg. F. on a hot plate or in a pail of boiling water. This is not so important for such pieces as reamers or taps, but for dies and others of irregular section it is good insurance against trouble. The ideal procedure, of course, is to take the work direct from the quench at between 200 and 250 deg. F. and place it in the tempering furnace.

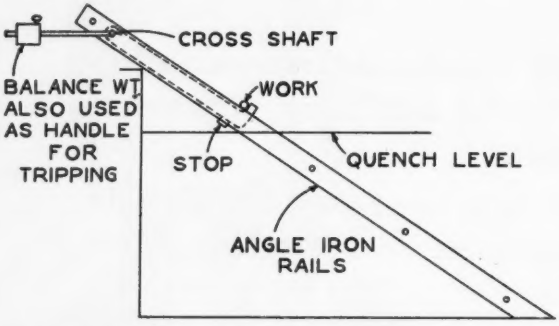


Fig. 4—Design of Chute for Quenching Long, Slender Pieces

Drawing temperatures depend upon the service required of the parts, so nothing further need be said here about individual tools. However, the temperatures are critical and must be under close control, for which reason automatic control instruments are highly recommended. Approximately one hour for every inch of cross section is a good rule here as in hardening and should give uniform results.

It might be useful to remember that temperatures up to 300 deg. F. will probably not reduce the maximum hardness of a 64 Rockwell C piece more than a point or two, but will frequently prevent breaking by removing strains. For this reason it is well to give every hardened piece of the class under discussion at least a slight draw.

Accurate tempering of selected areas of a part requires use of a salt bath into which the part can be immersed to a definite depth by the use of tongs, hooks, wires, or other similar means. The part should be left in the salt as long as possible to obtain thorough heating, limited by the speed with which the heat will travel up into the section to be hardened. The maximum length of time must be determined by experience, but polishing the upper section will help as the changing temper colors can thus be seen as the heat rises. At the last moment the piece should be quenched in water or oil to stop further tempering.

High speed steels present different problems. A number of new types are now available but with the exception of the temperatures used the tempering treatments are similar to those used either for the universally known 18-4-1 or the leading member of the newer group—the 8-9 per cent molybdenum 2 per cent tungsten type.

For both of these types a preheat is required (except on the smallest tools) to lessen the thermal shock of a sudden plunge into a heat which is

Combining Cuts to Cut Costs



Special Purpose McCrosky JACK-LOCK Tool Engineered to the Job. Bores 3 diameters, hollow mills, faces and chamfers.

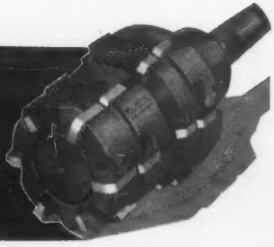
HERE'S a good example of how McCrosky's JACK-LOCK Wedge keeps tool design simple and practical when operations are combined to cut costs. The powerful and compact wedge occupies a semi-circular recess in the tool body. It allows ample room for all blades needed for multiple operations, permits sturdy body sections and abundant chip clearance.

FOR your reference file ask for Bulletin 15-M showing standard JACK-LOCK Milling Cutters, and also Bulletin 15-F showing special JACK-LOCK Tools engineered to definite jobs. When your job requires combining cuts to cut costs, send your work prints for a McCrosky JACK-LOCK layout.

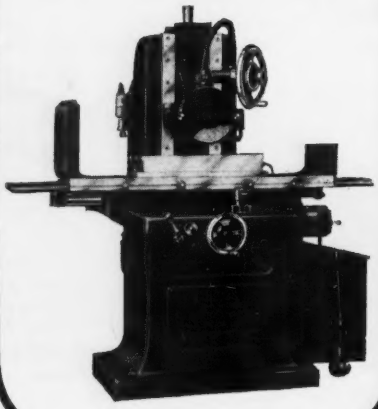
McCROSKY TOOL CORPORATION

Meadville, Pa.

McCROSKY JACK-LOCK
SPECIAL PURPOSE TOOLS
. . . . . *Engineered to the Job*



SPLIT TEN-THOUSANDTHS



with this

Grand Rapids Surface Grinder

Vernier wheel has .0001" graduations approximately ⅛" apart which can easily be split.

This feature, plus the infinite variations of table travel obtainable by hydraulic means, makes possible the highest degree of precision grinding at production speeds.

WRITE FOR CATALOG GL-100.

GALLMEYER & LIVINGSTON CO.

308 Straight Ave., S. W.
GRAND RAPIDS, MICH.

very close to their melting points. The preheat should be between 1,500 and 1,600 deg. F. for the 18-4-1 grade and about 100 deg. lower for the molybdenum steel. The first type may satisfactorily be heated in almost any furnace if the atmosphere is kept rich enough to prevent scaling.

However, for the second type, which requires close control of atmosphere, the ideal equipment is either a fuel-fired or electric muffle-type furnace having a gas curtain across the door with controls for mixture or one of a new kind which derives its protective gas atmosphere from the adjacent high heat unit. In preheating, the work should be brought up to furnace temperature slowly, allowing approximately forty-five minutes per inch of cross section. At this point the tool should be taken out and, with as short an exposure to air as possible, placed in the high-heat furnace.

Again, very simple equipment can be made to produce good results, but for scientific control and commercial uniformity, controlled atmosphere is essential. This requisite is available in fuel or electrically-heated units with gas curtains, as mentioned above, or in a new and promising gas furnace in which the protective gas is generated from charcoal burned in a built-in retort. This high heat equipment is all of the muffle type excepting the electric furnace, which is heated by refractory elements and needs no muffle.

Another way to provide the needed protection is to use, in a plain furnace, a muffle made of a special graphite-like material in which the work is placed on a tray of silicon carbide. This muffle will slowly burn away, producing a high enough concentration of carbon monoxide within itself to protect either type of steel fairly well.

Care should be taken not to touch



FREE SAMPLE KIT OF SHAKEPROOF PRODUCTS



Send for this free sample kit today!

Each Shakeproof fastening presents to metal product manufacturers an opportunity to improve performance and reduce production costs. Shakeproof engineers have developed these fastenings in their effort to improve metal fastening methods. If you have a fastening problem or a fastening product that requires development, write to "Fastening Headquarters!"

SHAKEPROOF LOCK WASHER CO.

Distributor of Shakeproof Products Manufactured by Illinois Tool Works

2501 North Keeler Avenue, Chicago, Illinois

Plants at Chicago and Elgin, Ill. In Canada: Canada Illinois Tools Ltd., Toronto, Ont.

Copyright 1940 Illinois Tool Works

SHAKEPROOF

"Fastening Headquarters"

SEMS Fastening Units . . . Lock Washers . . . Locking and Plain Terminals

Thread-Cutting Screws . . . Locking Screws . . . Spring Washers . . . Special Stampings

the hot carbon muffle with the work or the latter will immediately absorb enough carbon to lower its melting point and either be spoiled or completely destroyed before your eyes. It should not be necessary to add that, for high heat work, automatically-controlled temperature is a great help.

The temperatures used vary from 2,250 deg. F. for the molybdenum steel to 2,450 deg. F. for heavy, rough tools of 18-4-1 type. The exact point is determined by the thickness of the edges and corners of the tool and also from previous experience of service received from similar pieces.

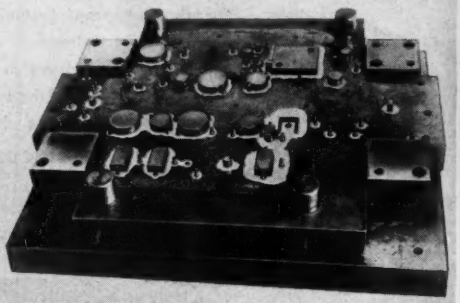
In general, the heavier the tool the higher the temperature and the longer the time in the furnace. Pieces of large section require a longer time in which to develop a structure which will produce maximum hardness and, in addition, are less likely to be damaged by blistering and pitting. Time at the high temperature ranges from two and one-half to eight or ten minutes and is very important for several reasons.

The grain size of the steel grows rapidly as time increases, and strength decreases accordingly. Surface conditions which are affected quickly in this range of temperatures become more pronounced as furnace time lengthens and may result in serious scaling or soft skin, depending upon the atmosphere. It is desirable, therefore, to watch the work carefully and quench quickly when it arrives at the same color as the furnace. The hardener who has learned from previous experience just how long this takes can quench by time rather than by sight.

The value of an atmosphere containing a large percentage of carbon monoxide has been definitely proved

CERROMATRIX saves 180 hours in this Punch and Stripper Plate

Mitcham Works Ltd. made this punch and stripper plate complete in 20 hours, using Cerromatrix as shown in stripper plate and in mounting of punches. Estimated time if done by fitting and filing methods — 200 hours. This tool has produced several hundred thousand blanks of .0625" steel sheet with no signs of shifting of punches.



Send for new free CERROMATRIX MANUAL

CERRO DE PASCO COPPER CORPORATION

44 WALL STREET, NEW YORK, N.Y.

BRITISH ASSOCIATES: Mining & Chemical Products Ltd., London, England

CANADIAN REPRESENTATIVES: Dominion Merchants Ltd., Montreal, Canada



"YANKEE" VISE

SPEEDS PRODUCTION

"Yankee" is a *fast-production* vise—different from any other vise in your shop! Squared all sides. Designed for continuous work—from bench to machine and back again—accurate results and no delay. "Yankee" Vise illustrated above, made in four sizes: No. 991, 1½" jaw width. No. 992, 2" jaw width. No. 993, 2¾" jaw width. No. 994, 4" jaw width. Hardened steel block, V-grooved, supplied for holding rounds.

"Yankee" Vise also available with removable swivel base. Sizes, Nos. 1991, 1992, 1993 and 1994.

ORDER FROM YOUR SUPPLY HOUSE. FOR "YANKEE" VISE CIRCULAR, WRITE NORTH BROS. MFG. CO., DEPT. MS, PHILADELPHIA, U. S. A.

with 18-4-1 steel. It should range around 20 per cent for good results. Such an atmosphere is of even greater importance in the treatment of the several molybdenum types, due to their great susceptibility to decarburization. This great drawback to their use has been largely overcome by atmosphere control with a monoxide content of up to 35 per cent. This development not only saves the surface, but considerably slows down the grain growth which takes place with extended time at these elevated temperatures.

The salt bath method of hardening, which requires preheat, high heat and quench in molten salts, also eliminates decarburization and is gaining popularity although still under the handicap of higher installation and operating expense.

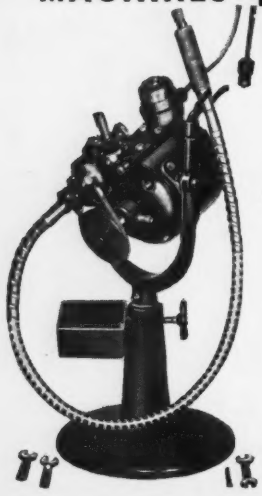
The high speed steels may be quenched in air where scaling is not detrimental and where minimum distortion is desired. However, the usual medium is oil, which should be kept at 150-200 deg. F. to keep down warpage. If large quantities of work are processed in a small tank, it will require circulation through a cooler, but in most installations a tank three feet square and three deep will stay cool enough. Quenching may also be done in a molten salt bath at 1,200 deg. F. and then in oil at room temperature.

High speed steels may be tempered in molten salt or in any other furnace which will maintain an even temperature of 1,050-1,200 deg. F. For this purpose either a salt pot or a recirculating furnace is best. When using salt it is advisable to warm the tools to about 200 deg. F. before immersing them. In anything except a salt pot the work should be held at heat for at least one hour for each inch of cross section to obtain uniformity and relieve strains. In the

HIGH QUALITY MACHINES

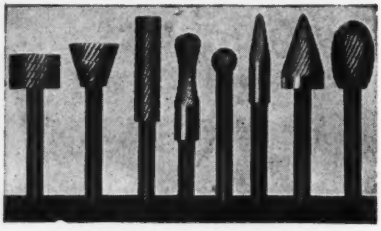
Strand
FLEXIBLE SHAFTS

THIRTY-FIVE YEARS IN THIS INDUSTRY



FLEXIBLE SHAFT MACHINES
1/8 to 3 H.P.
HIGH QUALITY ONLY

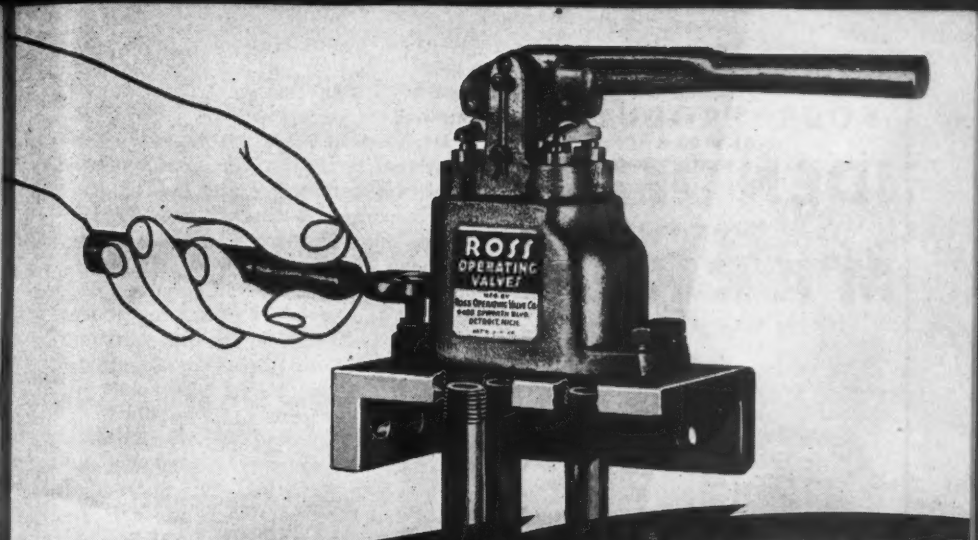
Ground Rotary Cutters
High Speed Steel



Rotary Files
Hand Cut
High Speed Steel

SEND FOR CATALOG

N. A. STRAND CO.
5001 N. Wolcott Ave. Chicago, Ill.



JUST 3 MINUTES

that's all the time it took me to change valves. . . .

★
A SIZE AND TYPE
FOR EVERY OPERATION
★

ROSS *Air Control* VALVES

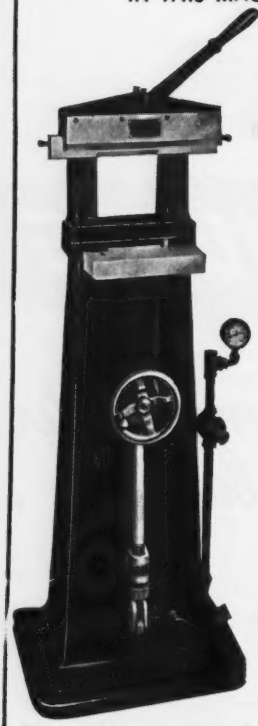
THE BRIDLE FOR AIR HORSEPOWER

Ross Valves permit speedy removal—only four bolts to turn and the job is done. All piping is installed permanently to bracket and need never be disturbed. Shut-down periods are thereby shortened and valuable time saved. It's another feature recommended and originated by Ross.

Send for Catalog

ROSS *Operating* VALVE CO.
6484 *Epworth Boulevard*
DETROIT, MICHIGAN

YOUR PRODUCTS
ALWAYS
IDENTIFIED
IF PERMANENTLY
MARKED
IN THIS MACHINE



MARKING BY ROLLING IS FAST AND ECONOMICAL.

PRESERVES DIE LIFE AND PIECE PARTS. REQUIRES ONLY FRACTION OF APPLIED PRESSURE AS COMPARED TO STAMPING.

QUICK SET-UPS

MODEL 25 HI-DUTY MARKING MACHINE

This machine operates from your plant air line, and is one of numerous models built to produce fast, neat marking on metal parts. Hi-Duty marking machines may be had for practically any marking operation, and we will be glad to make recommendations upon receipt of your inquiries. Send prints or samples of parts to be marked, showing lettering and location, also state required production.

GEO. T. SCHMIDT, Inc.
1806 BELLE PLAINE AVE.
CHICAGO, ILL.

salt bath this time may be reduced one-half.

High speed steel differs from carbon steel in that it has a "secondary hardness," and a reading taken after a proper draw will show one to three points higher than it did after the quench. The point at which the hardness will be greatest is around 1,050 deg. F. To give additional toughness to the steel, the temperature should be increased up to a maximum of about 1,200 deg. F. At this point the Rockwell hardness will be down to about 58 C. To go higher than this will seriously reduce the hardness and the cutting qualities. The shanks of reamers, taps, and so on, can be heated in lead to 1,300-1,400 deg. F. to make them tough and soft. When taken from the tempering furnace, high speed steel should be placed on the floor to cool. It should not be quenched.

Many of the highly-alloyed steels which are now available for such parts as drop forge and upsetting dies require treatments similar to those already described except for slightly different temperatures. All of the processes, including the use of protective atmospheres, are so nearly the same that they will be dismissed with a caution to follow manufacturer's directions carefully.

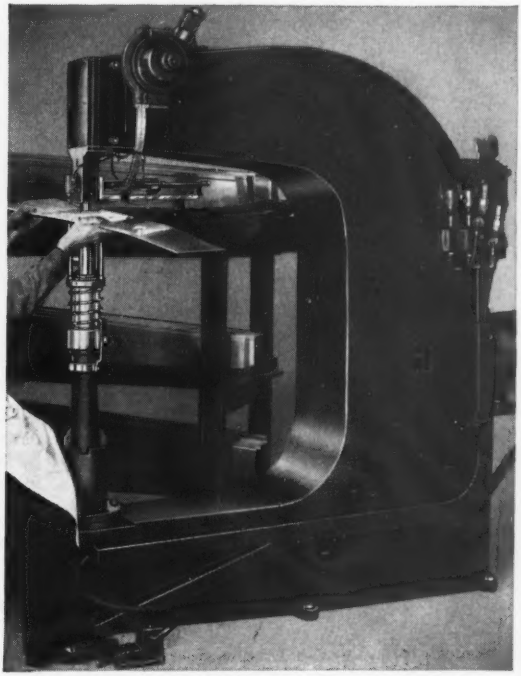
Hardness testing of carbon and high speed steels is done almost universally on the Rockwell instrument for parts of easily handled size, and on the Scleroscope for such parts as drop forging die blocks where the instrument, due to its size and weight, must be taken to the work. To obtain accurate readings with either instrument it is essential that the surface to be tested be bright, clean and free from scale or soft skin. Surfaces that are to rest on the anvil of the Rockwell must be clean and smooth. On very thin or delicate sections

Comes now...

SPEED of control in HYDRAULIC OPERATIONS

Speed of reaction without sacrificing efficiency is now being had by pneumatically controlling hydraulic power valves. There is an important saving in reaction time of pneumatic controls over the comparatively slower hydraulic reaction in identical circuits.

T-J Pneumatic Remote Controls provide full advantage of this saving also in that their variety of unit types permit their application to your requirements to be of standardized equipment.



T-J Controls are shown here on a T-J Hydraulic Rivitor. Developed for riveting aircraft fuselage and wing sections, the operator's station is necessarily some distance from the power valve. T-J Pneumatic Controls provide the desired snappy reaction to the power valve.

Bulletin number RC-4 reports on the high points of these systems in this application type as well as in many others in which they are being successfully and increasingly used. Your copy will be sent promptly upon receipt of your request.

this is a TOMKINS-JOHNSON product

factory at 620 N. Mechanic St., Jackson, Michigan. Agents in principal cities. T-J Products also include Air and Hydraulic Cylinders . . . Rotating Chucks and Cylinders . . . Rivitors . . . Clinchors . . . Special Equipment . . . Brownie Coolant Pumps . . . T-J Die Sinking Milling Cutters.

Announcing

AN ADUSTABLE DEPTH COLLET CHUCK BY UNIVERSAL



No tang or taper required. Uses broken or whole drills. Adjusts to within .002" to .003". Write for facts.

UNIVERSAL
Engineering Company
Frankenmuth, Mich.

which cannot be marked or subjected to great pressure, a good test file can be used with satisfaction in the hands of a good man. There are also many odd shapes on which a file is the only means that can be used.

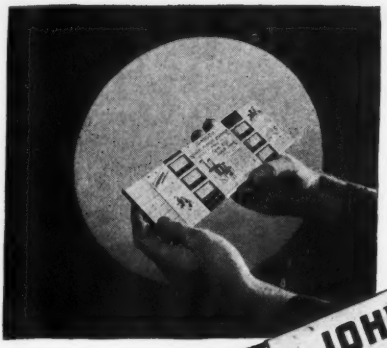
While there are multitudes of special steels and applications in common use which have not been covered in this paper, the author feels that with possible help from the general principles it contains, plus the assistance of the manufacturer's recommendations, the hardener can soon develop a technique which will enable him to meet the many demands upon his skill.

Wilson "Hornet" Bulletin. Dedicated to the "man in the helmet," this 18-page bulletin describes a revolutionary type of electric arc welding generator which has been placed on the market by Wilson Welder and Metals Co., 60 E. 42nd St., New York, N. Y., under the trade name of Wilson "Hornet." The bulletin is profusely illustrated with photographs for clean-cut definition of operating and construction details of this piece of welding equipment.

A practical feature of the bulletin is its informal, straightforward analysis of the arc welder's problems, and a discussion of the way in which this analysis is applied to the design of the Wilson "Hornet." Details of electrical and magnetic features of the "Hornet" are shown in a double-page spread of photographs. To emphasize the extreme simplicity of this welding generator, the order of assembly of the "Hornet" is also pictorially represented. In addition, complete specifications are listed.

Concluding sections of the bulletin contain data on the "Yellow Jacket" Pipe Line Welder as well as other Wilson A.C. and D.C. welding machines. Copy free upon request.

Barnes Piston Pumps PA-14-16-17-18 Series, designed for use with hydraulics, are illustrated and described in a four-page bulletin released by John S. Barnes Corporation, Rockford, Ill. Specifications are included. Copy free upon request.



SLEEVE BEARING SLIDE RULE

for ENGINEERS DESIGNERS MACHINERY BUILDERS

Our new catalogue lists and describes the most complete bearing service available. Ask for your copy.



● The trend in manufacturing today is definitely towards standardization of parts and materials. Builders know from experience that this is the *one* satisfactory method of securing economy and easy replacement.

It is now an easy matter to standardize on your sleeve bearings. We have produced a new slide rule that lists over 800 sizes of General Purpose standard stock bearings. This ingenious device is extremely simple to operate. You start with your shaft size . . . move the slide . . . and the desired combination of inside diameter, outside diameter and length instantly appears. All of the bearings so listed are cast in S.A.E. 64 and instantly available from stocks in every principal industrial center.

This slide rule is offered to you without cost or obligation. Simply write us—*on your business letterhead*—and the rule will go forward by return mail.

JOHNSON BRONZE

Sleeve BEARING HEADQUARTERS

590 S. MILL STREET · NEW CASTLE, PA.





"WHY NOT YOU?"

A GOOD WAY TO START THE NEW YEAR IS TO SWITCH TO "FULFLO" CENTRIFUGAL COOLANT PUMPS AND HYDRAULIC BY-PASS OIL RELIEF VALVES.

MORE MACHINE TOOL BUILDERS AND MACHINERY MANUFACTURERS ARE USING "FULFLO" PRODUCTS EACH DAY.

THEY ARE DEPENDABLE, EFFICIENT, AND WILL GIVE LONG TROUBLE-FREE SERVICE.

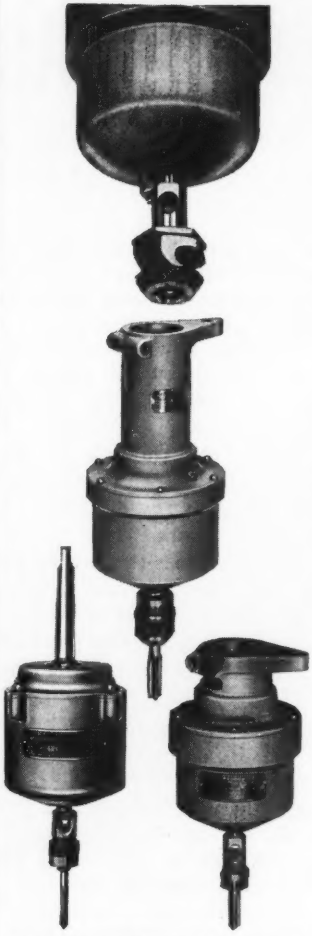
. . . Complete Information of the "Fulflo" Line Sent Upon Request

TRADE MARK "FULFLO" REG. U.S. PAT. OFF.

THE FULFLO SPECIALTIES CO. INC.

BLANCHESTER, OHIO

PROCUNIER TAPPERS



Try a PROCUNIER high speed tapper with the new TRU-GRIP Tap Holder in your own plant.

FOR PROFITABLE

TAPPING

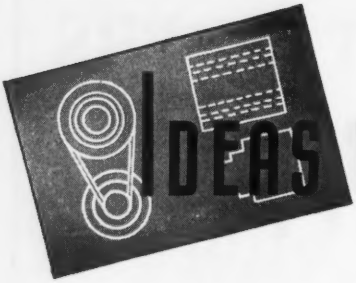
In addition to helping you slash tapping costs down to rock bottom, PROCUNIER Tapping Attachments give you better work and practically eliminate tap breakage. This saving alone, in many instances, has paid for the tapper in short order.

PROCUNIER High Speed Precision Tapping Heads are designed to suit every tapping need. Just note these big features:— "Double-cone" long life friction clutch; Ball Bearings throughout; three point balanced heat treated gear reversing mechanism and the new TRU-GRIP Tap Holder. The tap rotates in the tapping "in" direction when idling.

Write today for latest literature showing PROCUNIER High Speed Tapping Heads. Also hand, foot or air operated Automatic Tapping Machines.

PROCUNIER SAFETY CHUCK CO.

12 S. Clinton Street • Chicago, Ill.

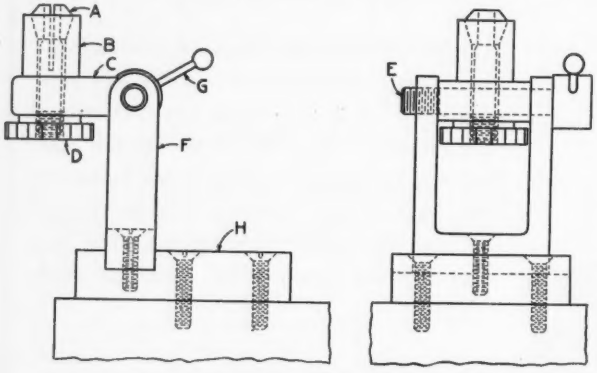


IDEAS FROM READERS

Bench-Type Slotting Fixture

By CHAS. H. WILLEY

A FIXTURE designed for use in holding small workpieces on which slotting or similar operations are to be performed at the work bench is illustrated in the drawing herewith. The fixture consists primarily of a lathe collet, **A**, fitted into a cylinder, **B**, which has been drilled and taper-bored to receive the collet as shown. The cylinder is mounted on the arm **C**, through which a hole has been drilled to receive the lower end of the collet. A washer and star handwheel **D** on the threaded end of the collet provide means for drawing the collet down into the cylinder in order to clamp the work.



Fixture for Holding Small Parts at the Bench

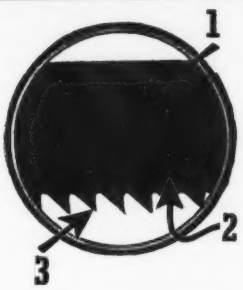
Arm **C** is mounted on the stud **E**, which passes through both sides of the yoke **F** and the yoke is anchored with machine screws to the cast iron base **H**. The base can be screwed to the work bench if desired. The stud is passed through a drilled hole in one side of the yoke and threaded into a tapped hole in the opposite side. As the stud is drawn tight, the sides of the yoke are drawn against the ends of the arm, locking it in position. The lever **G** in the head of the stud provides leverage.

The fixture can be used in the drill press or milling machine by removing the yoke from the base and clamping it in a machine vise.

Protection for Threaded Work When Chucking

By A. H. WAYCHOFF

OCCASIONALLY a machinist is faced with the necessity of clamping the threaded end of a workpiece



1. Tough Alloy Steel Back.
2. Integrally Welded.
3. Genuine 18% Tungsten High Speed Steel "Teeth."

MARVEL

A Tauter Blade Means A Straighter Cut!

On any hack sawing machine, a tauter blade means a straighter cut . . . a High-Speed-Steel cutting edge means faster cutting . . . and an unbreakable blade guarantees uninterrupted production and a full cutting life.

MARVEL High-Speed-Edge Hack Saw Blades offer all of these factors — permit cutting speeds, feed pressures, and blade tensions, limited only by the sawing machines' capabilities. These are the blades that built sales. Cut faster, cut straighter, and last longer—that are both strictly high speed and positively unbreakable.

Buy from your Local distributor

WRITE FOR CIRCULAR

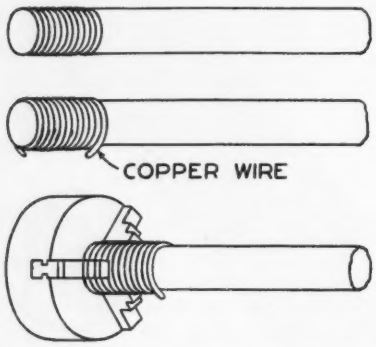
ARMSTRONG-BLUM Mfg. Co.

"The Hack Saw People"

5745 Bloomingdale Ave. Chicago, U. S. A.

Eastern Warehouse and Sales:
199 LAFAYETTE ST., NEW YORK

in the jaws of a lathe chuck in order that work may be done on the opposite end of the piece, which is a difficult thing to do without having a



Drawing Showing Use of Copper Wire to Protect Threads When Chucking Threaded Work

certain amount of damage inflicted on the threads by the chuck-jaws.

To solve this problem, one man discovered that by winding a length of copper or brass wire in the threads of the piece before chucking it, the piece could be held firmly in the chuck without damage to the threads.

This method of protecting the threads has also been found successful where threaded work was to be clamped in a bench vise.

Drill Hardening with Mercury

By Robert Grimshaw

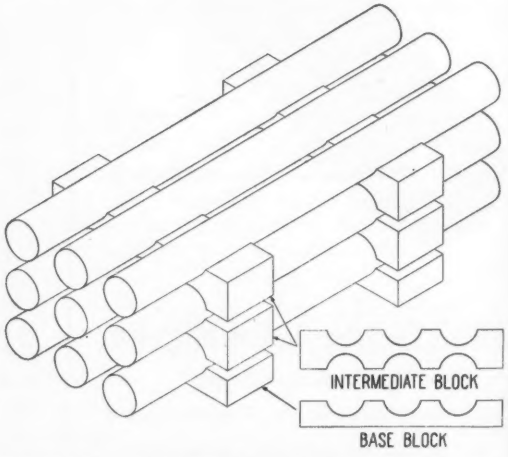
RECENTLY, the writer was approached by a dentist who complained that his drills were constantly becoming dull when working on tooth enamel. He stated that he had been following the method adopted by a large number of dentists for hardening their drills; namely, heating the drills to a straw yellow color and then quenching in candle wax.

To provide the dentist with a more successful method for drill hardening, I pointed out to him the fact that after the drills had been heated to a straw yellow color, they should be quenched in mercury instead of candle wax. Since mercury has been found to be a better conductor of heat than candle wax, this method of quenching produces greater hardness. In fact, after hardening with mercury, practically any type of tooth drill can be used to drill a hole in the average file.

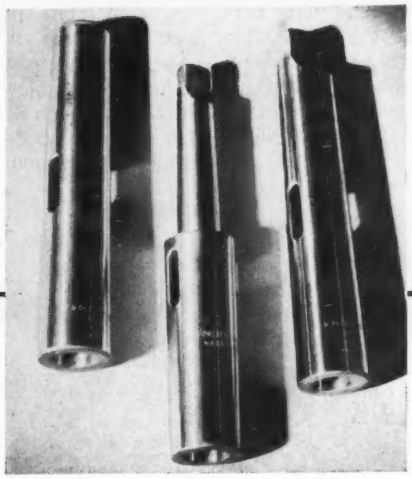
Portable Racking Blocks

By Joseph C. Hart

HEAVY round bars, tubes, and cylindrical pieces of all lengths can be stored in an orderly manner by the use of the blocks shown in the drawing. The blocks are of wood,



Drawing Illustrating Use of Grooved Blocks for Racking of Round Bars



SCIENTIFICALLY HARDENED

•

PRECISION GROUND

•

AMERICAN INDUSTRIES

WERE QUICK TO RESPOND TO THE ANNOUNCEMENT OF MIDWEST'S NEW HARDENED SLEEVES and HERE'S WHY—

1. Perfect tool alignment is assured by concentricity of the precision ground tapers of Midwest hardened sleeves and extension sockets.
2. Drill breakage, due to run-out caused by surface mars on the ordinary type sleeve, is now reduced to an absolute minimum.
3. Tool costs are definitely lower, because a Midwest hardened sleeve has a greatly increased length of life compared to the ordinary soft sleeve.
4. Immediate shipments are made from stock at minimum prices.

Ask for Bulletin 16-J

Savings are Earnings

MIDWEST TOOL & MFG. CO.

2318 W. JEFFERSON • DETROIT

Offices in all principal cities

with radial grooves cut just far enough apart so that the bars will not touch. Base blocks have grooves in one side only so that the bottom of the pieces will rest flat on the ground, the intermediate pieces having grooves on both sides.

Blocks and grooves should be of a size that will conform to the size of the parts to be stored and, when not in use, can easily be stored in an out-of-the-way place.

Gages for Checking Rolled Thread

By JOHN A. HONEGGER

ROLLED threads have generally been employed for electric light sockets or cannisters where the selection of the type of thread to be used is based upon the low cost other than the ability of the thread to withstand relatively high tensile or distortional stresses.

The rolled thread illustrated in enlarged section in Fig. 1 was developed to withstand a hydraulic stress up to 300 lb. per sq. in., at which point the end stress tending to deform or pull apart the assembly would be 1,947 lb. Because of this stress, it was found essential to the successful functioning of the pressure device that each and every shell be checked for minimum and maximum thread diameters, lead, ovality, and height of flange from shoulder.

As the holding power of the assembly depended upon the ability of the minor diameter in the head and the major diameter in the shell, it can readily be understood that any great deviation from the accepted standard would develop a rather dangerous condition and might result in the assembly being blown apart.

To test the rolled thread for ovality, oversize, and undersize, the indicator gage shown in Fig. 2 was developed. The gage consists primarily of the base plate **A** upon which is mounted the nest plate **B**, the plunger **D**, the indicator **F**, and the limit plate **H**. The nest plate **B** is anchored in position by means of dowels and screws, as shown. The plunger **D** is held in position by the housing **C**, which is also screwed and doweled in place. The plunger slides freely in its housing and is prevented from sliding out by the screw pin **E**, the pin also being used as a handle.

The indicator arm **F** is positioned so that the projection on the arm is in proper contact with the rear end

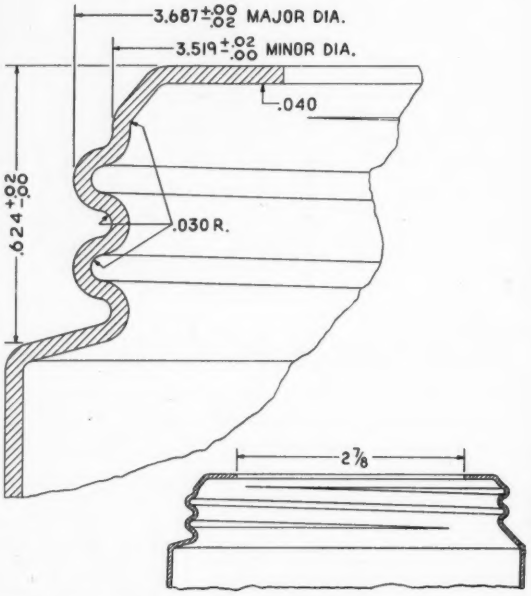


Fig. 1—Drawing (Enlarged) of Section of Rolled Thread



THERE'S LONGER LIFE IN *Bath Taps*

● You can resharpen a BATH TAP again and again without loss of efficiency because its metal structure is correct and uniform.

This uniformity from core to cutting edge is brought about by the Bath method of grinding from the solid AFTER hardening.

Next time order BATH "ground from the solid" TAPS—they last longer and therefore cost less.

JOHN BATH & CO. ● WORCESTER, ● MASS.

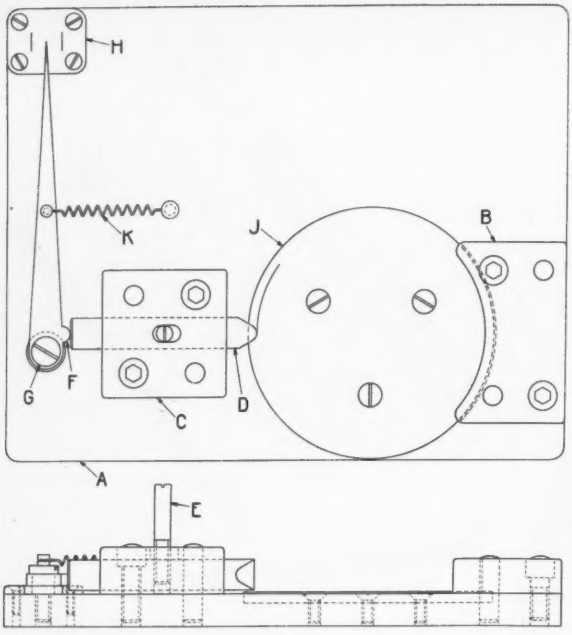
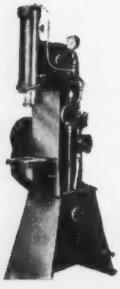


Fig. 2—Drawing of Gage Used to Test Ovality, Oversize, or Undersize of Rolled Thread

of the plunger **D**, and is anchored in position by the screw **G**. On the plate **H** are inscribed the maximum and minimum limit lines within which the end of the hand must remain if the thread on the shell is passable. Contact between the projection on the arm and the rear end of the plunger is assured by the use of the spring **K**. As the shell is finished in chrome, a brass rest, **J**, is recessed into the base plate so that the shell can be inspected without scratching the finish.

In operation, the plunger **D** is pushed back and a shell is placed in position on the plate **J**. When the plunger is released, the spring **K** pulls the indicator arm, applying sufficient pressure to the plunger so that the workpiece is forced against the nestplate **B**. In this position the shell is rotated 360 degrees and if, during the rotation, the indicator point remains within the limit lines on the plate **H**, the shell is passed. If, however, the indicator point passes outside the limit lines and remains there for more than 10 deg. of the circumference of the shell, the shell is rejected. The gage checks not only the ovality of the shell but also any deviation of the outline from a true circle.

The shell is next inspected with the gage shown in Fig. 3, which



GREENERD
Arbor Presses
500 lbs. to 35 tons pressure
HYDRAULIC, MOTOR DRIVEN, HAND OPERATED
Greenerd Arbor Press Co., Nashau, N. H.



Where Do You Buy Your DAVIS Boring Tool CUTTERS?



If you need a pair of Davis Cutters, made of some special metal, such as Stellite, Tungsten Carbide, etc., it isn't necessary that you order direct from the manufacturer of that metal.

As the manufacturer will conscientiously tell you himself, the best place to buy cutters for Davis Boring Tools is from the Davis Boring Tool Company. You'll get them just as cheap — you'll get them correctly ground — and most important of all, you'll be sure of a perfect fit.

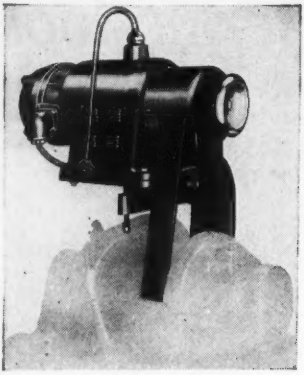
Stellite cutters, as well as Tungsten Carbide Tipped Cutters, in the more popular sizes are carried in stock for immediate shipment. Write us today.

DAVIS BORING TOOL DIVISION
LARKIN PACKER COMPANY, Inc.
ST. LOUIS, U. S. A.

DAVIS
BORING TOOLS

Modernize

YOUR SHOP WITH LIMA GEAR SHIFT MOTORS



FEATURES

Eliminates countershafts . . . 4 speed automotive transmission . . . All steel, heat-treated gears run in bath of oil . . . Hand wheel rotation of machine spindle . . . Instant reversibility with all speeds . . . Designed for 1800, 1200 and 900 r.p.m. motors, either single or two speed . . . Adaptable for flat or "V" belt . . . Easily installed. Compact, patented unit.

Write for complete information.

LIMA ARMATURE WORKS, INC.

438 N. MAIN ST. LIMA, OHIO

checks the thread contour, lead, angularity of the thread with the shoulder and top flange, height of the threaded neck, maximum diameter of the opening in the flange, and eccentricity of the flanged-over edge with the thread.

The gage, **A**, is simply a threaded and knurled ring in which the contour of the thread is duplicated in

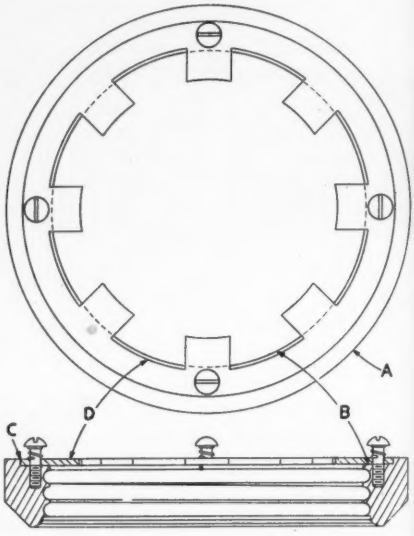
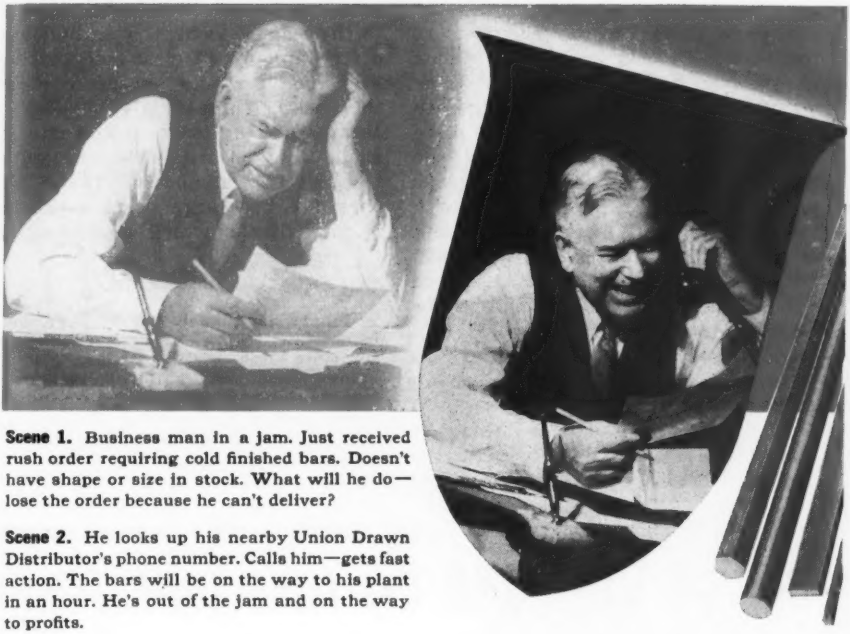


Fig. 3 — Drawing of Gage Used to Check Essential Dimensions of Threaded Neck

profile, the lead of the thread being the same as that in the shell. The gage is machined at **B** in the same manner as the mating member and a recess **C** is counterbored in the top of the ring. To the recess is fitted the notched plate **D**, which has clearance of 0.005 in. The smallest diameter formed on this plate is the maximum diameter desired in the shell opening, while the largest diameter of the slotted sections is 1/32 in. larger than the diameter of the ledge **B**. The plate **D** is normally held against the

How to get out of a jam

IN ONE ACT



Scene 1. Business man in a jam. Just received rush order requiring cold finished bars. Doesn't have shape or size in stock. What will he do—lose the order because he can't deliver?

Scene 2. He looks up his nearby Union Drawn Distributor's phone number. Calls him—gets fast action. The bars will be on the way to his plant in an hour. He's out of the jam and on the way to profits.

When you need cold finished bars or shafting in a hurry, this one act will get you out of the jam: Call your nearby Union Drawn Distributor.

In more than a hundred warehouses in all important cities, complete classified stocks of dependable Union Cold Finished Steels are ready for prompt delivery. Every Union Drawn Distributor is qualified and eager to offer suggestions and advice on the selection of the proper steel and how best to work it.

Get acquainted with your Union Drawn Distributor. Make a note of his phone number. You'll get action whenever you use it.

REPUBLIC STEEL

UNION COLD FINISHED STEELS

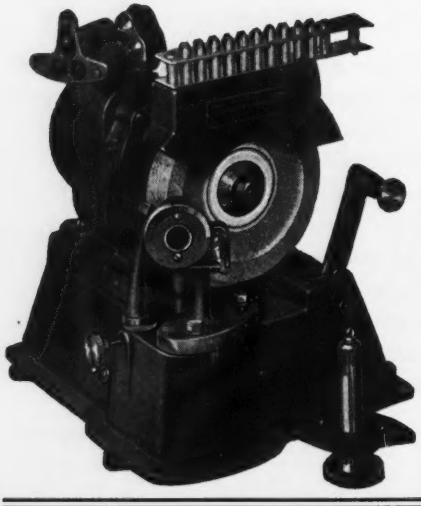
bottom of the recess **C** by four springs under the heads of four machine screws.

In operation, the gage is threaded onto the shell until the lower part of the gage rests on the shoulder of the shell. In this position a glance at the top of the gage will show whether the shell neck and flange are of the correct height. If the plate **D** is flush with the gage and the prongs rest on the flange, the neck is of the proper height and square with the shoulder. If, however, the neck is short, the bottom of the gage will rest on the shoulder and clearance will appear under the prongs. If the neck is too high, the plate **D** will project above the top edge of the gage. Should the flange be at an angle with the shoulder, the plate **D** will cock on an angle so that the flange is out with the shoulder.

Now, if the inspector looks down on the gage, he can see instantly whether the opening in the flange is larger than the maximum allowed or if it is eccentric. In addition, he will note how much eccentric the flange is to the ledge **B**, which is an indication of the amount of clearance that will exist between the mating part and the shell. If the ring gage does not thread all the way down onto the shell, it is an indication that either the minor diameter of the shell thread is too large or that the lead is off, either of which would be cause for rejection.

Hobart Handbook. A 20-page handbook illustrating and describing the complete line of electrodes, electrode holders, hood and hand shields, protective clothing, and welding, ground, and power cables marketed by Hobart Bros., Box MS-99, Troy, Ohio, has been released by this firm. Copy free upon request.

BLACK DIAMOND *Precision Drill Grinder*



Quickly Pays for Itself

. . . the only drill grinder that will grind your small wire gage and fractional drills accurately. It holds the drill in a fixed position while making a complete revolution. It grinds the lips exactly the same length, gives the drill the proper angle and clearance to insure easy cutting.
The only machine which will give this precision grinding on any size drill from No. 60 wire gage to 11/32" fractional without complicated adjustments. No. 2 grinds ⅛" to ½". No. 3 grinds ¼" to ¾".

WRITE FOR BULLETIN No. 121.

BLACK DIAMOND SAW & MACHINE WORKS, INC.

45 NORTH AVE • NATICK, MASS.



THE OLD WAY MEANT "STOP AND GO" SANDING

There used to be three steps in finishing aluminum. *First,* put on your disc. *Second,* watch it fill up and heat. *Third,* cuss it and take valuable "time out" to change.

FINISHING ALUMINUM?

TODAY'S WAY IS TO CALL THE AP ENGINEER!

. . . who makes worthwhile suggestions like this: ordinary *tallow* has increased abrasive life 15% to 25% for scores of AP customers who sand aluminum. And the AP Engineer's recommendation of the one correct type and grade of abrasive means even bigger savings.





MASTERPAK, used only by AP, avoids waste because it delivers abrasives factory-fresh — clean, dry and unbroken, with no sheets to throw away. Still another reason to specify AP for all abrasive needs.

HUNDREDS of plants, in dozens of industries, have lowered finishing costs with the help of the AP Engineer. Whether your problem is sanding 5-ton castings or finishing plastic bracelets, you'll profit by his help. And the AP Free Trial Offer will PROVE the savings, without your risking a dime! Write today. Abrasive Products, Inc., 507 Pearl Street, South Braintree, Massachusetts.

ABRASIVE PRODUCTS

SOUTH BRAINTREE MASSACHUSETTS

JEWELOX • JEWEL EMERY • JEWEL GARNET JEWELITE • JEWEL FLINT • NEW PROCESS

INC.



Can We Report "Progress"?

THE year 1939 has passed, and with but few mourners. The so-called civilized world heaved a sigh of relief at its passing although, from the standpoint of world progress, there is no assurance that 1940 will be any better. As we go to press the flames of war are sweeping Europe and Asia and we here in America are nervously watching the sparks, wondering if we can prevent the conflagration from spreading to our own country.

The American attitude toward the war in Europe is interesting in the light of what took place at the beginning of the "first world war.' When the European nations began, in 1914 and 1915, placing orders with American manufacturers for war materials, a gleeful scramble for war orders was on. Practically every manufacturer who could make anything that the belligerents could use got into line for his share of the gravy. Here were buyers who had to have shells and guns and mines and what not, and there was little haggling over prices. The gods were showering riches down upon us, and we could do less than accept them.

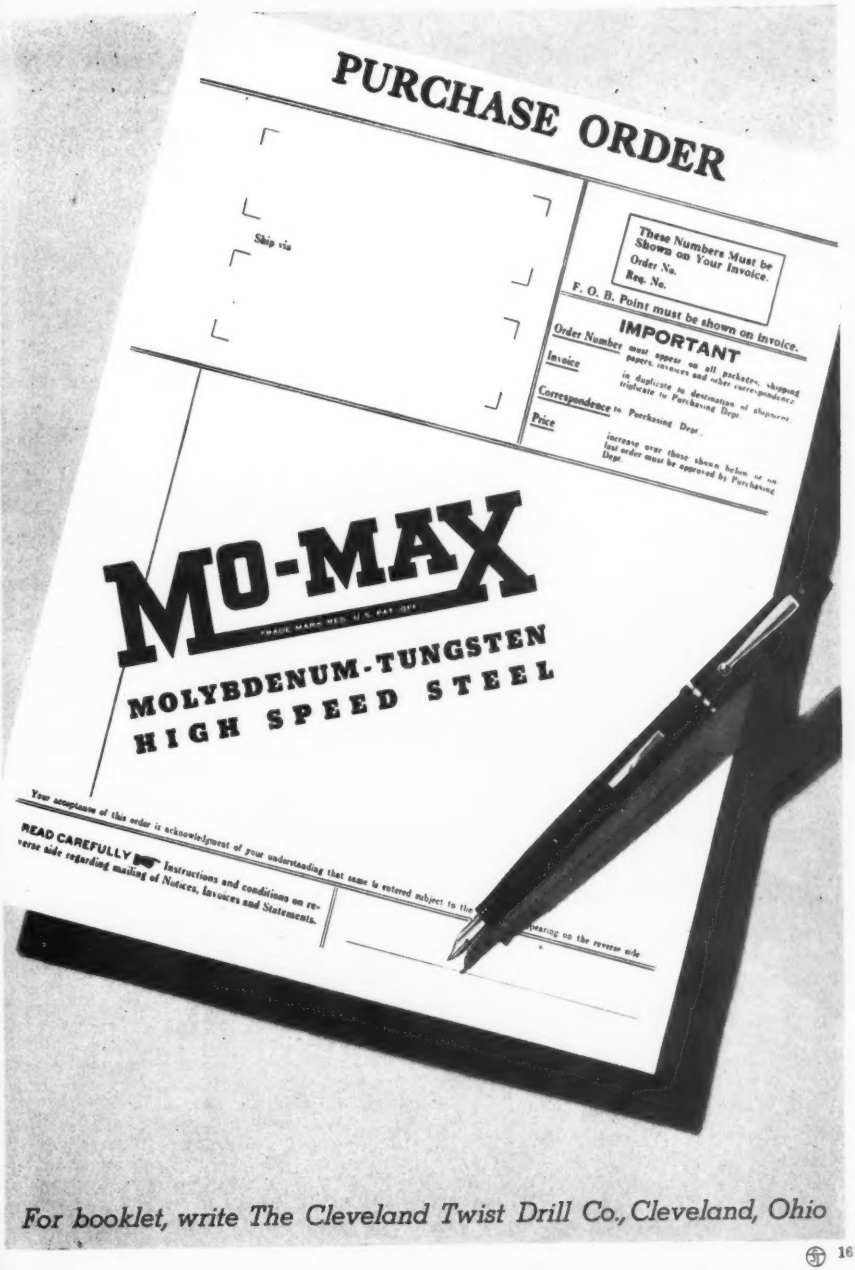
Then America became involved, and the manufacture of war munitions settled down to the grim business of supplying our own forces, which was as it should have been. However, in the course of time the war closed, and although the lack of man-power at home and the need for the materials of peace maintained business activity for a time, eventually the men returned to their homes and jobs and then the first post-war depression set in. This one lasted only a year or so, but the bread-lines were long before business began to resume normal speed again, and the profits that had been made through war trade were largely dissipated.

Today there is little scramble for war orders from abroad. On the contrary, many American manufacturers have stated flatly that they want no part in the profits from war. We have begun to see that somehow moral values are tied in with intrinsic values and that, while the individual may profit from such dealing, the nation at large will lose. We may have a flurry of unusual prosperity temporarily, but the reaction which is sure to follow such an event will probably not only wipe out any extra profits that may have been made, but may very conceivably leave us worse off than before.

The production of materials for protection is another matter. We are all interested in protecting our nation against the greed and avarice of foreign governments who may be jealous of our natural advantages, our progress, and our comparative prosperity. The wars on both sides of us are going to be no short-term affairs; on the contrary, all the factors necessary for a long drawn out conflict are present and your editor, for one, will be most surprised if either Europe or Asia settles down to peace within three years.

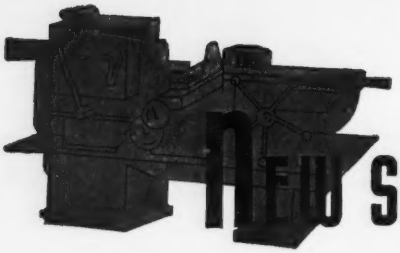
If this guess is correct, nothing less than the best that we can do regarding national defense and preparedness against aggressor nations will be enough. We will have to pay for it, of course, but taxes for such a purpose should — and will — be paid gladly.

"Eternal vigilance is the price of peace."



For booklet, write The Cleveland Twist Drill Co., Cleveland, Ohio

161

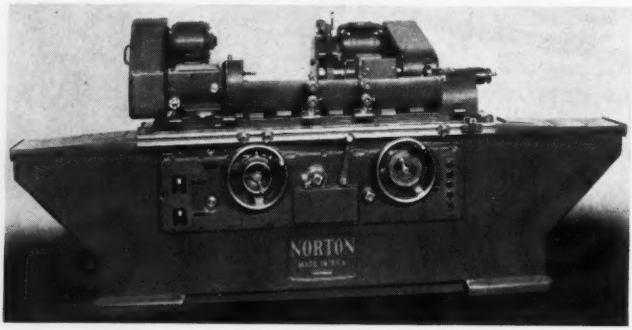


NEW SHOP EQUIPMENT

Norton 12-In. Type LC Multipurpose Grinder

A universal grinding machine to be known as the Type LC Multipurpose is announced by Norton Company, Worcester, Mass. Being a universal machine, it performs both external and internal grinding operations with equal ease.

A number of interesting features have been incorporated in the design. The table can be reciprocated hydraulically or, if desired, by hand through a two-speed arrangement. When power traverse is engaged, the hand traverse is disengaged, and vice versa.



Norton 12-In. Type LC Multipurpose Universal Grinder

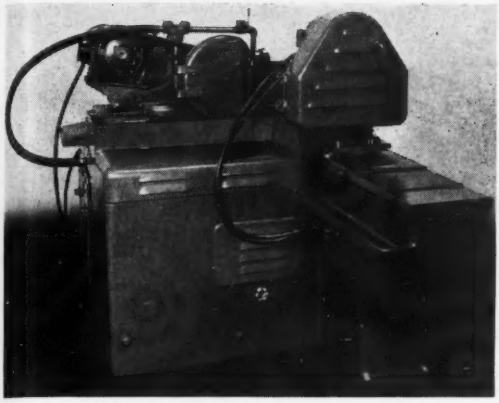
Two ranges of feed are available, either of which is selected by means of a single knob. Each hole in the index is equivalent to a work diameter reduction of 0.0004 in. in the fast range and 0.0001 in. in the slow range. A stop is provided against which the handwheel can be located. An electric dwell control for the hydraulic traverse mechanism, which enables the operator easily to adjust the amount of dwell desired at each table reversal, is standard equipment.

The headstock is of the universal type and is driven by either a ½ h.p. constant speed A.C. or an adjustable speed D.C. motor. Cone type V-pulleys provide four work speeds ranging from 65 to 260 r.p.m. when an A.C. motor is supplied. In either case, work revolution is push button controlled.

Both live spindle and dead center operations can be performed, the change from one type of drive to the other being accomplished by adjustment of a knob on the front of the headstock. The base is graduated and can be set at any desired angle either side of the zero or normal position. All bearings are pressure lubricated by an impulse type motor driven from the jackshaft and the final drive to the face plate is by chain.

The wheel slide can be swiveled to any desired angle and fed at this angle or fed perpendicular to the table ways. Quick adjustment of the wheel slide is another feature; by releasing a single binding screw, it is possible to move the wheel unit backward or forward, thus increasing the distance between wheel and work centers by as much as 6 in. if desired.

The internal spindle is bolted to the front of the wheel slide and driven by a flat belt from the same motor that drives the external spindle. A selector switch provides for reversing the direction of the wheel drive motor, facilitating both internal and external operations. The external wheel guard need not be removed for internal grinding and only in exceptional cases must the



Left Hand Side View of 12 x 36-In. Type LC Multipurpose Grinder

external grinding wheel be dismounted.

All push buttons and starting switches are built into neat panels flush with the front of the machine and motor control equipment is mounted in a cored receptacle in the rear of the base. Electrical equipment is protected from dust and moisture. The machine swings 12 in. and is built in 24, 36, 48, and 72 in. lengths, the weights ranging from slightly over 5,000 to just under 7,000 lbs. Floor space 5 ft. wide and ranging from 9½ ft. for the shortest machine and 17½ ft. for the machine is required.

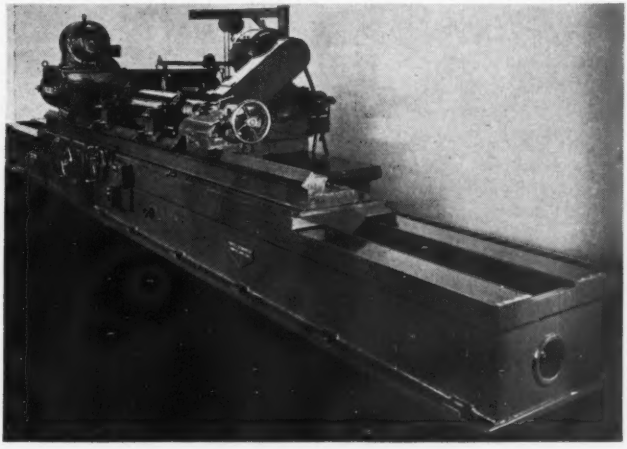
Farrel Type TT Cylindrical Grinder

A cylindrical grinding machine, the design of which incorporates several novel and valuable features, has been developed by Farrel-Birmingham Company, Inc., Ansonia, Conn. The machine, to be known as the Farrel Type TT Grinder, is built with a traveling work table and fixed grinding wheel unit, and is equipped with a sensitive reversing mechanism which permits grinding up to the shoulder of a shaft. Once set, the traverse and reversal of the traveling work table are automatic and require no further attention from the operator.

The grinder can be set for the work, after which it operates automatically. All mechanical and electrical operating controls are within easy reach of the operator and are so conveniently arranged that he has complete control of the operation without leaving his position.

For hand operation a handwheel and clutch are provided, with handwheel control for hand feed of the grinding wheel as well as electrical controls for rapid in-and-out movement of the wheelhead. The table may be reversed automatically or by hand, and rapid traverse is available through lever contact control. Start and stop push button stations control the motors driving the grinding wheel, table, and water pump, with a start-jog-stop control for the headstock.

The design of the work table drive has been improved to secure positive,



Farrel Type TT Cylindrical Grinder

vibrationless traverse, steadiness of travel, and smooth, accurate reverse. The table is driven by an adjustable speed reversing motor through a two-speed drive with accurately generated, double helical gears, through worm and worm gear meshing with a drive rack on the traveling table. This type of drive is said to be exceptionally smooth. Reversal of the table is accomplished electrically, eliminating mechanically reversing clutches.

The traveling work table is mounted on inverted V-ways superimposed upon the front bed of the machine. On the traveling table are mounted the headstock, including motor and drive, footstock, and neck rests for supporting the workpiece. A back bed is provided for the grinding wheel unit, the back bed being keyed and bolted to the front bed. The wheelhead rests on a sub-base which is hinged in front on two tapered trunnions. An intermediate base is interposed between the sub-base and the back bed.

Maximum accuracy and stability are assured by heavy, rugged construction. All finished surfaces are accurately machined. Headstock and tailstock are of massive construction and the wheelheads and all other parts are ample in weight and correctly proportioned.

Seven motors are required for the various drives—eight if a taper grinding mechanism is incorporated. The grinding wheel and headstock are driven through V-belt drives and the gear unit for the traveling table is driven by a reversing motor through a V-belt drive.

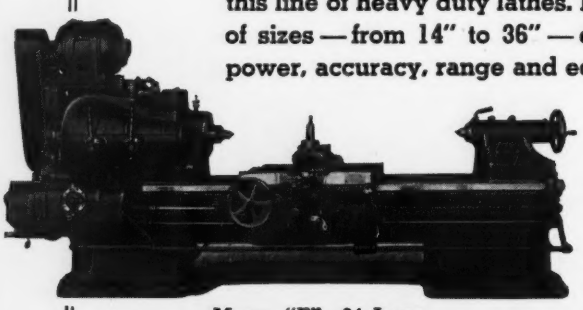
Wells No. 9 Metal Cutting Band Saw

Designed for the all around work of cutting off sprues and gates from castings, for the pattern shop, for cutting stock for dies and die blocks, for cutting sheet metal, and for general machine shop work, the Wells Manufacturing Corp., Three Rivers, Mich., has brought out the No. 9 Metal Cutting Band Saw shown in the illustration. Using a band ½ in. wide by 0.024 in. thick, the machine is designed to operate at speeds of 60, 90, 250, and 500 ft. per minute.

The frame is of cast iron and consists of one piece bolted to a cast iron base which may be bolted to the floor.

Boye & Emmes Lathes

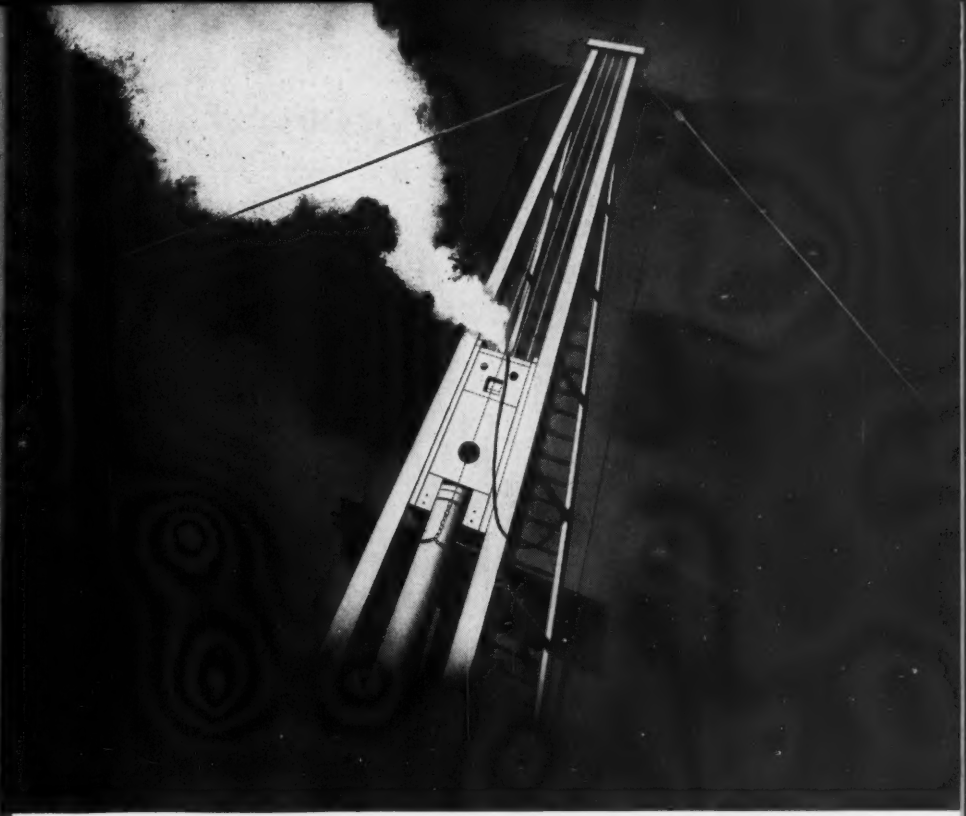
Forty years of specialized manufacture are behind this line of heavy duty lathes. Made in a full range of sizes — from 14" to 36" — each of outstanding power, accuracy, range and economy.



Write for complete detailed specifications.

MODEL "E"—24 INCH

THE BOYE & EMMES MACHINE TOOL CO.
CINCINNATI • OHIO



PILE DRIVERS CAN'T CALL "TIME OUT"

When a pile driver goes to work time is generally the essence of the contract, with penalties for non-fulfillment an ever-present threat. Hence the ability to give continuous service under difficult conditions and with a minimum of attention is an essential requirement. That, in turn, depends largely on the choice, for each part, of the material best adapted to the job.

One manufacturer, whose pile drivers have made an enviable record for trouble-free performance, guards dependability by making the ram piston—a vital part—of Nickel-Chromium-Molybdenum Steel. This steel develops to a high degree the particular combination of toughness, strength and hardness, in the heavy sections used, which is necessary to withstand the rigors of the service.

A re-check of your own materials specifications may disclose possibilities for increasing dependability by the use of Molybdenum Steels. Send for our free technical booklet, "Molybdenum in Steel".

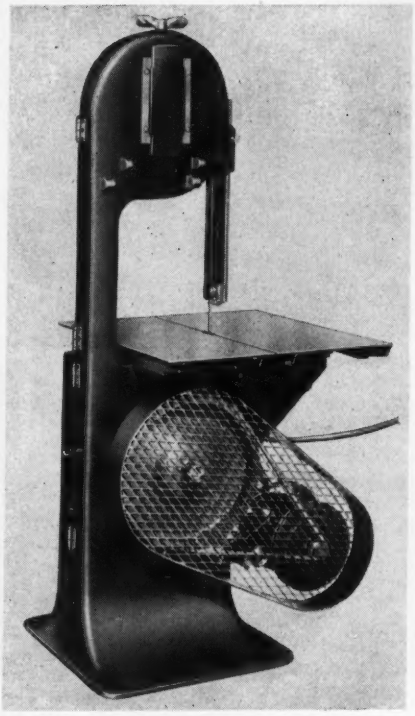
PRODUCERS OF MOLYBDENUM BRIQUETTES, FERRO-MOLYBDENUM, AND CALCIUM MOLYBDATE

Climax Molybdenum Company
500 Fifth Avenue, New York City

MOLY

The table, which is 26 x 28 in., is of heavy metal plate bolted through structural steel bars to the base. The throat is 11¾ in. deep by 15½ in. high. New Departure grease sealed ball bearings are used throughout and the reduction gears, consisting of one cast iron and one non-metallic helical gear enclosed in an oil-retaining gear box, run in oil. The wheels are designed to narrow blades for contour work as well as the regular ½-in. blades for wood or metal.

The machine is powered by a Peerless ¾ h.p. 1,750 r.p.m. motor and the drive is through V-belt. Floor space required is 28 x 30 in. and the weight is 600 pounds.



Wells No. 9 Metal Cutting Band Saw

Porter-McLeod Wet Abrasive Cutting Off Machine

The illustration shows the Porter-McLeod Wet Abrasive Cutting Off Machine now being offered by Porter-McLeod Machine Tool Co., Hatfield, Mass. In the illustration the machine is shown mounted on a tank-floor pedestal, although the machine is also available in the bench type. The pedestal is of cast iron and the lower part of the pedestal forms a coolant tank having capacity of 8 gal. The bottom of the tank is inclined and is provided with a clean-out door with a drain plug so that the coolant can be drawn off before removing the door for cleaning out the

GRAY TURRET HEAD
METAL CUTTER OR NIBBLER

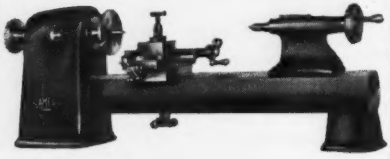


GRAY, Originator of First Practical Metal Cutter or Nibbler

Most modern Nibbler for Template Cutting, Tool Rooms, Shipbuilding, Aircraft Parts, Aircraft Tubing, Sheet and Plate Shops.

GRAY MACHINE CO.
Box 596, Philadelphia, Pa.

AMES BENCH LATHES



Precision lathes for doing most accurate turning, drilling, milling, threading, filing, polishing, in the tool room or in production.

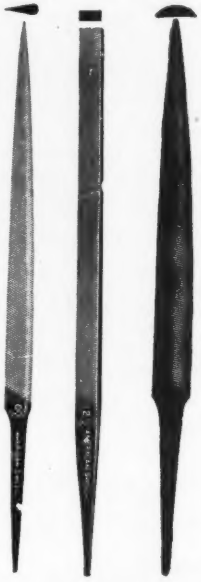
Send for Complete Information

B. C. AMES COMPANY
WALTHAM, MASS.
6309

American Swiss Files of Precision for Results

SWISS PATTERN FILES

MADE IN UNITED STATES



American Swiss Files are quality precision tools—the product of long experience in file making.

Their reputation for long life, keener filing edges, better results and lower filing costs has been earned by actual use in the hands of skilled mechanics everywhere.

More than 2500 regular shapes, cuts and sizes from which to choose the exact type file for the job. Special files made to order. Every file rigidly inspected for shape, cut, size and hardness, and guaranteed for performance.

Buy Them From Your Distributor

AMERICAN SWISS FILE & TOOL CO. Elizabeth, N. J.

ALSO MANUFACTURERS OF MECHANICS' HAND TOOLS AND KNURLS

sludge. The pedestal is also provided with a large inspection door of welded steel and louvres for ventilation.



Porter-McLeod Wet Abrasive Cutting Off Machine

The wheel, which is 12-in. diameter with a 1-in. hole, is mounted on a spindle of high carbon steel, accurately ground and mounted on Timken bearings. Wheels can be from 0.045 in. to $\frac{1}{8}$ in. thick, the thinner type being intended for use on ceramics. Maximum diameters intended to be cut are 1 in. on solids and 1½ in. on tubes.

Power is supplied through a 1½ h.p. motor driving through three V-belts to the wheel spindle. The motor is mounted on an aluminum plate, adjustable for belt take-up, and controlled through a magnetic switch with push button or hand starter.

The machine is provided with a turntable which may be set in 5 deg. steps in either direction up to 45 deg. angle for angle cutting. Special angle blocks can be furnished to suit any angle. The fulcrum shaft is of hard drawn bronze rod and is held rigidly in the base. The swinging frame is provided with two bearings of ample size and is carried on the fulcrum shaft in a balanced position, providing ease of operation. The operating lever is so placed as to be equally convenient for right or left hand operation.

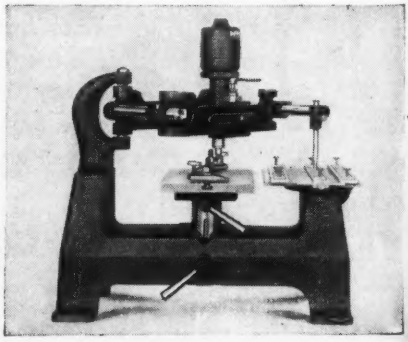
Floor space required, 21 in. x 33½ in. Bench space, 28½ x 33½ in. Net weight of pedestal type, 670 lbs.; bench type, 295 pounds.

Preis Combination Engraver and Electric Etcher

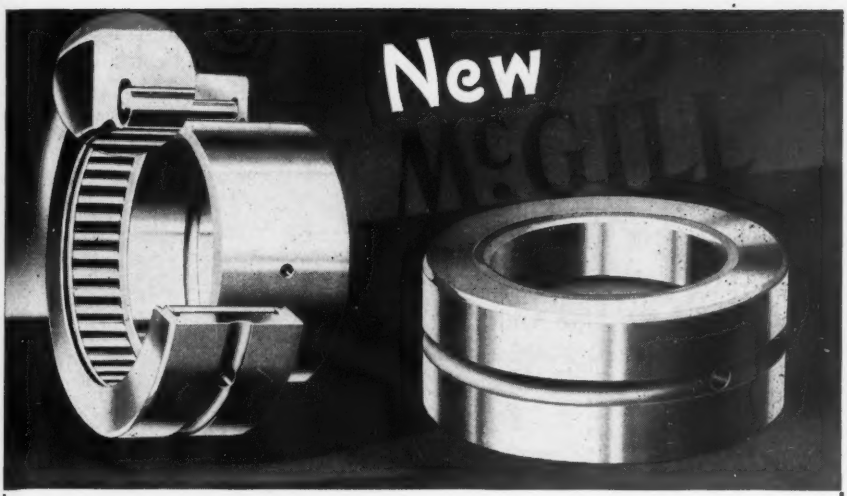
A bench-type pantographic machine for general industrial engraving work on all materials and for electric etching on soft or hardened steel has been introduced by H. P. Preis Engraving Machine Company, 157 Summit St., Newark, N. J. Separate heads, quickly interchangeable, are used for the two classes of work.

On engraving work the depth of cut is controlled, independent of the depth of master characters, by a micrometer adjustment mechanism on the engraving head. Movement of the engraving cutter toward and away from the work is controlled by a cam-action drop lever, thus eliminating the necessity of raising and lowering the pantograph. Either raised or sunk engraving can be produced. For engraving on uneven surfaces, on slightly concave or convex surfaces, or on objects varying in thickness, an automatic depth-of-cut regulator is furnished.

On electric marking, contact of the etching point with the work is con-

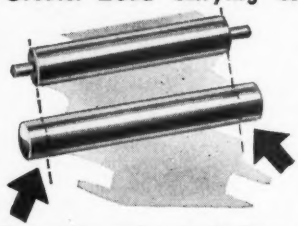


Preis Combination Engraver and Electric Etcher with Engraving Head in Place



"Solidend" MULTIROL

Greater Load Carrying Capacity with No Increase in Bearing Width



More roller surface in the New McGILL "Solidend" means more load carrying capacity!

An entirely new outer race construction, made possible by a special process of fabrication, permits the use of full-length rounded-end rollers instead of trunnion-end rollers in the New McGILL "Solidend" *MULTIROL* Bearing. A minimum of clearance between end shoulders and inner raceway, makes bearing self-sealing. With approximately 12% more effective roller surface, it gives you more load-carrying capacity, in comparison with other bearings of the same width. No end washers or retainer rings to get bent when making tight-fit shaft installations, yet, like the trunnion-end roller bearing, it can be assembled right on the shaft without inner raceway — outer raceway always holds rollers in place. This simplified construction means less cost in manufacturing — more savings for you, and a bearing that is easier to install!

Available in a variety of shaft sizes up to 5 inches, used with or without inner raceway. **Write for Further Details.**

McGILL MANUFACTURING COMPANY
1500 N. Lafayette Street
VALPARAISO • INDIANA

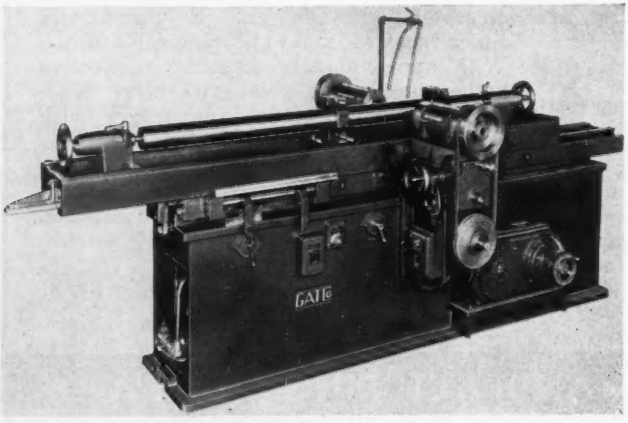
trolled by a sensitive spring pressure. The etching point may be removed from its fixture and used as a hand-etching pencil for rough or freehand marking. An electrical transformer provides three or more voltage stages for various depths of marking.

The compactness of the unit and the fact that it can be plugged into any light socket for instant use are features that make it adaptable for a wide range of industrial and commercial work.

Gatco Duplex Spline Miller

Presented herewith is a duplex miller for keyways or spline cutting, built by Giern & Anholtt Tool Co., Inc., 1312 Mt. Elliott Ave., Detroit, Mich. The machine is intended especially for simultaneous and accurate machining of keyways spaced 180 deg. apart.

The machine is equipped with two tables; one the reciprocating feed table and the other, or top one, designed to slide freely to location, in which position it is locked. Excepting for the tables, which are of cast iron, the machine is constructed of welded steel. The machine has capacity of 96 in. between centers, and handles diameters up to 5½ in. Cutter diameters are ⅞ to 1 in., and spindle speed ranges are from 230 to 600 per minute. The table is operated hydraulically and has a maximum travel of 12 inches.



Gatco Duplex Spline Miller

Knerr-King Portable Brinell Hardness Tester

A portable hydraulic instrument that makes the standard Brinell test with a gradually applied load of 500, 1,000 or 3,000 kilograms on a 10-millimeter ball has been introduced by Andrew King, 521 Broad Acres Rd., Narberth, Pa. It is claimed that the instrument will do any testing that can be done on a stationary Brinell machine.



Knerr-King Portable Brinell Hardness Tester

The complete instrument weighs less than 26 lbs., can be conveniently taken to work that would be difficult to transport to a stationary type of hardness testing machine, and can be operated in any position, even upside down. The instrument has a throat capacity of 4 in. deep by 10 in. high. Bars, rails, castings, tubes, and forgings and similar parts can be tested in place with this tool.

NEW, LONG LENGTH

STRAIGHT SHANK

HIGH SPEED DRILLS

9" Cutting Flute
12" Long

IN STOCK



Size	Length Overall Inches	Length of Flute Inches	Our Net Price Each
3/16	12	9	$1.50
7/32	12	9	1.60
1/4	12	9	1.75
9/32	12	9	1.85
5/16	12	9	2.00
11/32	12	9	2.25
3/8	12	9	2.50
13/32	12	9	2.75
7/16	12	9	3.00
1/2	12	9	3.25

Orders for 12 or more assorted sizes will take 10% discount from above prices.

Money Refunded If Not Satisfied

●

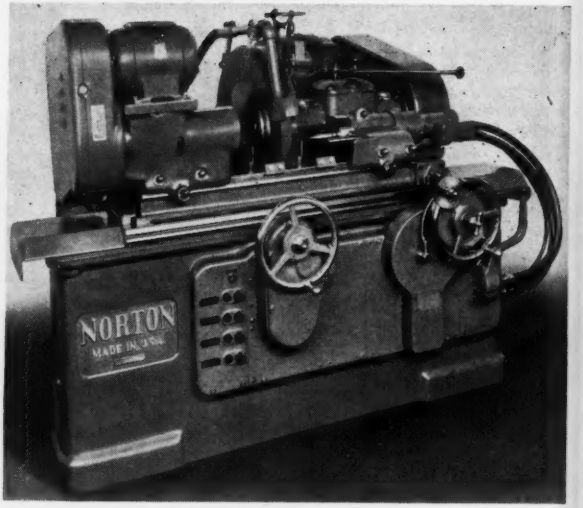
Send for Our New 1940 Catalogue

VICTOR MACHINERY EXCHANGE, INC.

251 Centre Street **New York, N. Y.**

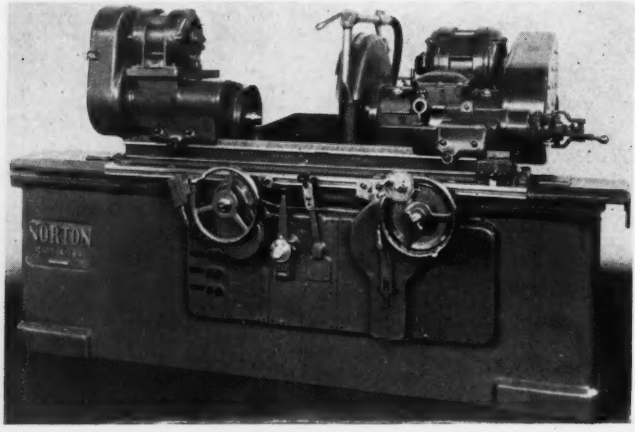
Norton 10-In. Type C Cylindrical Grinders

Although bearing the same type designation as an earlier model, a number of interesting and practical refinements have been incorporated in the new line of 10-in. cylindrical grinders announced by Norton Company, Worcester, Mass. The most outstanding change has been the general appearance; a feature that necessitated a completely new base. Oil and coolant pumps are now suspended vertically on springs so that they operate submerged. All motor starting equipment is mounted in a cored receptacle at the rear of the base isolating it completely from dust or moisture. The wheel slide and table ways are pressure lubricated from a separate system, thus permitting the use of oils of different viscosities for strictly lubricating purposes and as the hydraulic fluid for operation of the various units so controlled. The headstock, which has been redesigned, is driven by V-belts and a silent chain running in oil. Large spindles and centers assure more rigid support.



10 x 18-In. Norton Type C Semi-Automatic Grinder

Type C machines are available with hand, hydraulic or mechanical traverse of the table. A semi-automatic model is, however, also built which can be arranged for either hand or hydraulic table traverse. In addition, semi-automatic machines are usually equipped with hydraulically operated footstock and headstock. Used as a plunge cut machine, parts are ground by simply placing the work between the centers and moving a single lever which causes the wheel centers to close, the wheel slide to advance, rotation of work, deceleration of wheel to grinding feed, stop and dwell for final finish and size, retraction of wheel slide, and stopping of work rotation. Operation of the lever withdraws the footstock center so that work can be removed. Semi-auto-



10 x 36-In. Norton Type C Hydraulic Traverse Grinder

BILLIONS OF COPIES OF THE NEW YORK NEWS

ROLL OVER BANTAM BEARINGS



Bantam Roller Bearing used on both plate and impression cylinders of presses which print the NEWS. 5½ in. bore, 7½ in. O. D.

THE gigantic GOSS presses which print THE NEW YORK NEWS must deliver the world's largest newspaper circulation —nearly two million daily, over three million Sunday. In the Manhattan press room, a section of which is shown above, are 21 press units. In the Brooklyn plant are 30 additional units. These units may be combined to form presses capable of printing papers from 32 to 102 pages and each press delivers 48,000 complete issues per hour.

Bantam Roller Bearings are used on the two ton plate and impression cylinders of each press unit—408 Bantam Bearings in all. When these huge presses are "rolling" there's a combination of weight and speed which puts a tremendous strain on bearings. Yet —since 1931, when Bantam Bearings were first installed, there has been complete freedom from bearing trouble.

In these 8 years billions of copies of the NEWS have been run over Bantam Bearings without a single replacement! Just another example of the part Bantam engineers play in helping a wide range of industries solve tough friction problems vital to their successful operation.

BANTAM BEARINGS CORPORATION, South Bend, Indiana
Subsidiary of THE TORRINGTON CO., Torrington, Conn.

TAPERED ROLLER—STRAIGHT ROLLER—BALL

BANTAM

BEARINGS



TO ALL BUILDERS OF MACHINES —TO ALL USERS OF MACHINES

We proudly offer this story—a reprint of a recent ad in Time "news magazine." You will see what we mean when we say, "Bantam Bearings are really TOUGH."

408 Bantam Bearings on these giant Goss presses . . . rolling out many millions of newspapers during the past 8 years . . . without a single bearing failure! Goss design engineers were wise to select Bantam Bearings for these fastest-running newsprint presses in America.

It is wise to select Bantam Bearings for ALL friction problems. Then, buyers and users of your machines, too, will share the good news—more years of service without breakdown on Bantam-equipped machines!

Bantam engineering service is at your disposal. Take advantage of our experience in applying all MAJOR TYPES OF BEARINGS.

BANTAM BEARINGS CORPORATION
SOUTH BEND, INDIANA
Subsidiary of THE TORRINGTON CO.
Torrington, Conn.

matic machines can also be arranged for manual control, a dial gage indicating the correct size of the work.

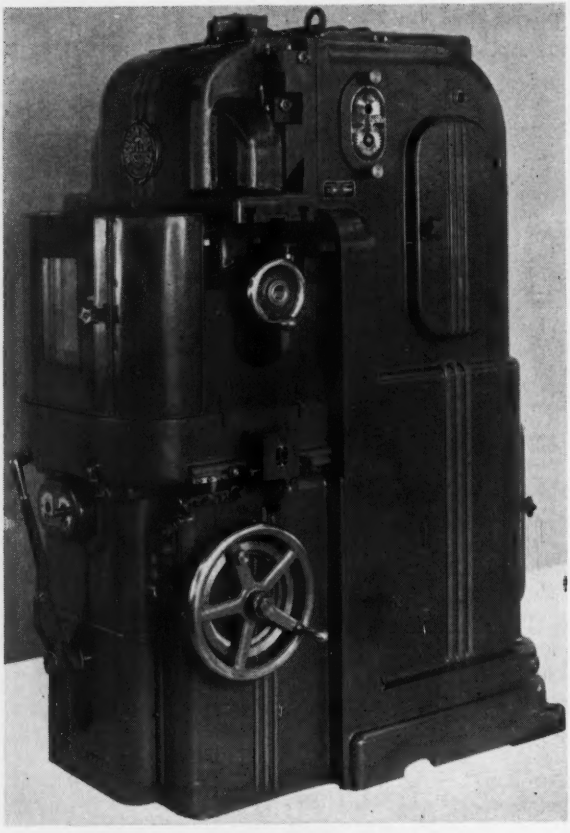
These machines can be converted from manual to automatic control by turning a convenient switch at the front of the machine.

Michigan 860-A Wide-Range Gear Finisher

A companion machine to the improved "860" rotary crossed-axis gear finisher recently announced by Michigan Tool Company, 7171 E. McNichols Rd., Detroit, Mich., the Michigan 860-A embodies provisions for finishing gears up to five in. in width, as well as splines on long shafts, without requiring wide cutters. For such work the standard fore-and-aft table feed is locked out, and a combination of reciprocating transverse workhead travel and vertical table feed is cut in.

A selector switch permits ready change from the underpass method finishing gears of more conventional size to the transverse feed method. When the latter is used, the cutter carrying table is locked in a central position and the feed, by automatically raising the knee of the machine a fixed amount each stroke of the reciprocating head, becomes vertical.

A counter with a dial indicator, accessible behind a door in the column, permits selection of the number of strokes for finishing the gear while while the amount of feed per stroke is controlled by setting an electric timer graduated in ten thousandths.



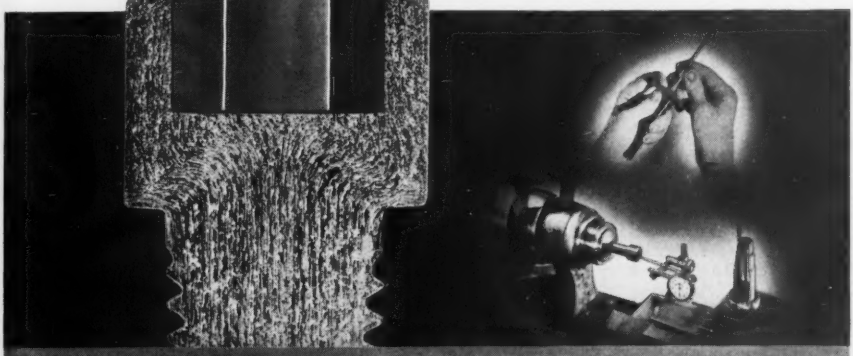
Michigan 860-A Wide-Range Gear Finisher

A separate electric motor drive is provided for the feed. In series with this motor is a plugging timer to provide quick stopping of the feed motor, assuring accuracy of amount of feed per stroke, the timer reversing the current to stop the motor. Operation of the feed is through "Cone-Drive" area contact worm gearing, as is the drive to the head for transverse reciprocation. The use of this gearing provides greater smoothness of operation, resulting in finer finish and longer tool life.

A hand lever on the front of the machine permits rapid lowering of the knee for re-loading and raising back to automatic feed position. Number of oscillations (speed) of the head is controlled by means of change gears, while a limit switch with trips on either side, controls the length of the transverse stroke.

When gears of conven-

This ENGINEERED SOCKET Saves Muscle and Minutes — FOR USERS OF PARKER-KALON SOCKET SCREWS



SUPERIOR SOCKET DESIGN PLUS UNIQUE PRODUCTION CONTROL — in Parker-Kalon's laboratory, makes every socket perfect in shape, size, depth, centricality. A wrench enters this True-Fit, Flat Base Socket QUICKLY and makes a POSITIVE ENGAGEMENT. Rounding-out is prevented. Costly splitting is overcome, too, by the design and Parker-Kalon Cold-forging which concentrates metal where strains are greatest.

"16 POINT QUALITY-CONTROL" Leads Critical Buyers to Demand PARKER-KALON

Socket Dimension Tests are only one part of the 16-check routine on important characteristics of Parker-Kalon Cold-forged Socket Screws. In a laboratory without counterpart in the industry, quality is guarded by tests and inspections covering:

1—Chemical Analysis. 2—Tensile Strength. 3—Ductility. 4—Torsional Strength. 5—Ability to take Shock Loads under Tension. 6—Resistance to Shock Loads under Shear. 7—Hardness. In addition, there is a rigid inspection of these essentials: 8—Head Diameter. 9—Head Height. 10—Concentricity of Head to Body. 11—Socket Shape. 12—Socket Size. 13—Socket Depth. 14—Centricality of Socket. 15—Class 3 Fit Threads. 16—Clean Starting Threads.

In this way Parker-Kalon maintains a new higher standard of quality in Socket Screws . . . a standard that satisfies the most critical buyer. Send for free samples . . . . see for yourself.



PARKER-KALON CORP., 198M Varick Street, New York, N. Y.

PARKER-KALON Cold-Forged SOCKET SCREWS

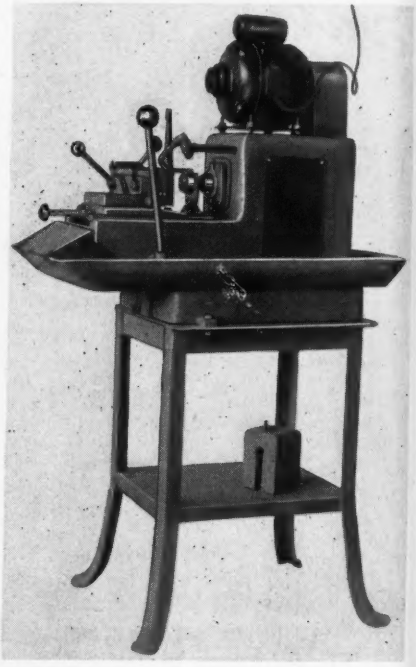
tional width are being finished, operation of the machine is identical with that of the 860, using a constant table height (without vertical feed) and allowing the table carrying the cutter to feed toward the rear of the machine, pause, and return, while the cutter is rotating in mesh with the work being finished.

The new 860-A is available in three sizes, for finishing gears up to 8 in., 12 in. and 16 in. in diameter. Maximum distance between work carrying live centers is 18½ in., but by means of an optional offset special headstock, this may be increased to 25½ inches.

Geometric Precision Threading Machines

To the line of precision threading machines made by The Geometric Tool Company, New Haven, Conn., have been added two new sizes: No. 16 and No. 11. The No. 11 is a bench-type machine.

The No. 16 machine will cut threads up to 1-in. diameter in National Coarse Thread Series, in sizes up to 1½ in. in fine pitch threads. Maximum length of thread cut with vise is 5¾ in., and the maximum length with collet is 9 in. These figures are based on use of a 1-in. K. D. die head and vise equipped with automatic work gage. Capacity with standard chuck jaw bushings is ¼ to 1¼ in., maximum opening of the bushings being 1½ in. Capacity with collet-type chuck; round, 1 in., hex, ⅞ in., and square 23/32 in. Capacity of



Geometric No. 16 Precision Threading Machine

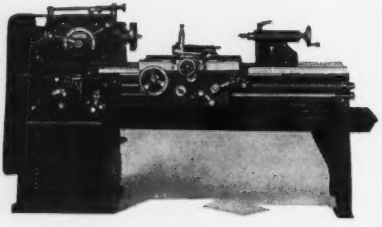
coolant reservoir is 5½ gal. Floor space required, 28 x 58 in. Approximate weight of machine with motor, net, 1,025 lbs.

Although intended primarily for fine pitch threads up to $\frac{1}{16}$-in. diameter, the No. 11 machine may also be used on finer pitches up to $\frac{1}{16}$-in. diameter. The maximum length of thread cut on this machine with vise is 3½ in. and with collet, 5⅝ in. These figures are based on the use of a $\frac{1}{8}$-in. K. D. die head and vise equipped with automatic work gage. Capacity with standard chuck jaw bushings, ⅛ in. to $\frac{1}{8}$ in. Maximum opening of bushings, ¾ in. Capacity with

New

"C & J"

15" and 16" Lathes

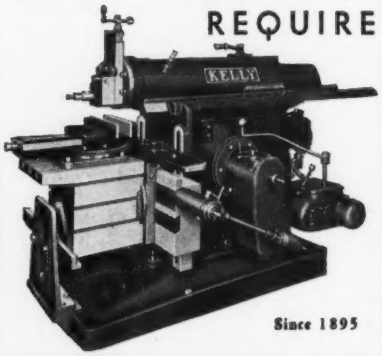


12 Speed Geared Head-Motor Drive
Timken mounted spindle
Modern Design—Liberal Dimensions

Write for bulletin.

The Carroll & Jamieson Machine Tool Co.
BATAVIA • OHIO, U. S. A.

KELLY SHAPERS REQUIRE



Since 1895

NEGLIGIBLE MAINTENANCE

BUILT BY

General Engineering & Mfg. Co.

ST. LOUIS • MISSOURI

GRANT RIVETERS



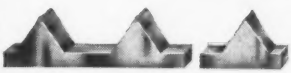
• Pioneers in the riveting field. Head rivets from smallest to ¼" diameter, either by noiseless spinning or vibrating hammer method.—Sizes to meet all needs.—Types include Vertical and Horizontal Multiple Spindles.

Write for literature—and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.

96 SILLIMAN AVE. BRIDGEPORT, CONN.

½ HOUR'S WORK IN 1 MINUTE with the DoALL



At the Ward Leonard Electric plant in Mount Vernon, N. Y., brass plate stock 1/16" thick is stacked in lots of 5 to 20 pieces, depending upon the job, and sawed on the DoAll. These 5 pieces 36" long were sawed in 5 minutes, or 1 minute each. Former time, 30 minutes each.

STARTLING RESULTS

Contour Sawing, the new DoAll process of machining, is recognized as the fastest precision method of removing metal; cuts out internal and external shapes from any metal up to 10" thick.

Does work of 3 machines. DoAll is a moderately priced, rugged precision machine tool that replaces shaping, milling and lathe work on a large variety of jobs with enormous savings.

Used in large and small plants in 30 countries by such firms as General Electric, International Harvester, Simmons Co., Picatinny Arsenal, Midwest Machine & Tool, Solar Aircraft, Canadian National Rys., Neptune Meter Co., Fisher Body, etc.



Let a factory trained man bring a DoAll to your plant and show you what it does, what it saves on your own work.

FREE! New Handbook on Contour Machining; 158 pages of valuable metal working helps.

CONTINENTAL MACHINES, INC.

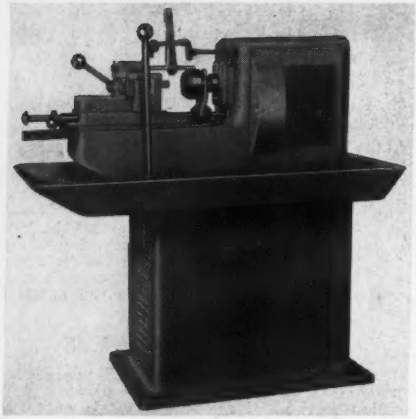
1306 S. Washington Ave., Minneapolis, Minn.

☐ Send data on the DoAll MM-1

☐ Send Free Handbook

Name.....

Address.....



Geometric No. 11 Precision Threading Machine

collet-type chuck: round, ½ in.; hex., $\frac{7}{16}$ in., and square, $\frac{11}{32}$ in. Capacity of coolant reservoir, 3½ gal. Floor space required, 23 x 36 in. Approximate weight of machine with motor, without pedestal, net, 305 lbs. Motor recommended, ½ h.p., 1,800 rev. per minute.

K. O. Lee 150, 200 and 250-Amp. Arc Welders

K. O. Lee & Son Company, Aberdeen, S. D., has brought out a line of arc welding machines in three models: 150 amp., 200 amp., and 250 amp. The new machines follow the characteristic design of the former models, having a round, streamlined case with an oval dome, and with open ventilation at the top. The number of heat taps on the 200-amp. model has been increased from 10 to 14, and on the 250-amp. model from 10 to 16. For heat taps, straight holes with spring pressure plugs are used, which assures good contact at all times because the plugs wipe the holes clean as they are pushed in.

The welders are ventilated through the bottom and the upward movement of the air is unimpeded as the open area



K. O. Lee Arc Welder

is greater at the top than at the bottom. The natural draft affords the utmost in efficient ventilation.

Voltmeters are available on all models if desired and it is recommended that

TANNEWITZ DI-SAW

SAVES AN AVERAGE OF $4.80 EACH HOUR IT'S USED



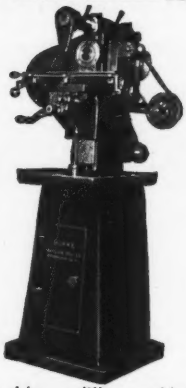
Inside and outside cuts on dies, shoes, templets and endless other jobs can be done in a small fraction of the time required by former methods. Saws, files and polishes. A highly developed, large capacity machine.

Write for Literature.

THE TANNEWITZ WORKS

GRAND RAPIDS - MICHIGAN

BURKE Milling Machines



No. 4 Motor Driven Milling Machine

Mounted on Cabinet Column

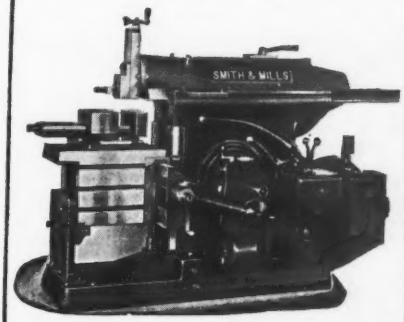
Burke motor driven milling machines, Nos. 1, 2, 3, and 4 are specially suited for handling small, difficult work on a production basis.

Write for complete information.

BURKE MACHINE TOOL CO.

297 E. 16th St. Conneaut, Ohio

SMITH & MILLS SHAPERS



Automatic lubrication—forced feed. Multiple disc clutch and brake. Quick feed changes. Direct reading feed and stroke dials. Power rapid traverse to cross feeds.

THE SMITH & MILLS CO.

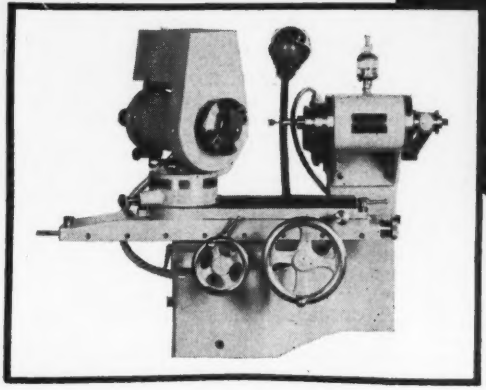
CINCINNATI • OHIO

BERGRAM

Bench Type

INTERNAL GRINDER

IG-1



An accurate grinder suitable for set-ups that require quick changes for straight, tapered and beveled holes or for single-purpose production. Diamond dresser automatically controls selected hole size.

By changing spindles, this model grinds all sizes of holes from 3/16" to 3".

Write for complete details

BERGRAM

Mechanical Engr. Co., Inc.

NEW BRITAIN • CONN.

a voltmeter be used because many times the line voltage is not sufficient for good welds. A two-wheel hand truck is also available for transporting the welder from one part of the shop to another. Four casters are regularly supplied, but the hand truck has advantages where the floor is rough or when it is necessary to move the welder considerable distances.

Redesigned Ex-Cell-O Precision Boring Machines

The line of "Junior" and "Senior" Precision Boring Machines built by Ex-Cell-O Corporation, 1206 Oakman Blvd.,



Ex-Cell-O No. 2112 Junior Single End Precision Boring Machine

Detroit, Mich., has been redesigned to incorporate a number of recent developments including an improved hydraulic control. The precision boring machines have been styled to conform to the lines of other Ex-Cell-O machines so that all Ex-Cell-O machine tools now have a "family resemblance."

The hydraulic operating controls are concentrated in one panel at the front of the machine. Table movement is controlled automatically by adjustable dogs below which, in the top of the panel, are five hydraulically controlled plungers. Three graduated orifice dials at each side of the panel control the rates of feed and the dwelling time at each end of the table stroke. The hydraulic system provides a constant rate of rapid traverse and two adjustable feed rates in each direction of table travel. Provision is made for connecting hydraulically operated fixtures and spindle chucks in such way as to co-ordinate their operation automatically with the table cycle. Dogs may also be used to control starting and stopping of the spindles and of coolant flow.

As on previous machines, the ways under the table are long enough to cover the base ways at each end of the stroke. Bridges can be adjusted endwise on machine base rails to reduce lost time and motion in table travel and from one to four spindles can be mounted on each bridge at any angle to the line of table travel for taper boring and turning.

The capacity of the Junior Precision Boring Machine is ⅜-in. minimum and 6-in. maximum diameter hole, 12-in. maximum table travel, ½ to 40 in. per minute table feed, and 15 ft. per minute rapid traverse. Capacity of the Senior machine is ⅜-in. minimum and 8-in. maximum diameter hole, 16-in. single end and 15-in. double end maximum table travel, ¼ to 18 in. per minute table feed, and 10 ft. per minute rapid traverse.

Rusnok Vertical Milling Attachment

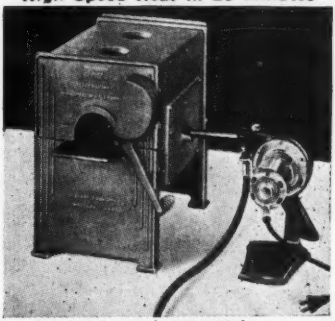
A horizontal milling machine can quickly be converted into a universal miller by the use of the Rusnok High Speed Motor Driven Milling Attachment illustrated herewith and marketed by Lockwin & Company, 205 W. Wacker Drive, Chicago, Ill. Designed to fit all round overarm milling machines, the attachment will operate at any angle, single or compound. The mechanism is entirely Timken roller bearing equipped. The built-in capacity of the Rusnok attachment enables it to be used on heavy work and at the same time makes possible the benefits to be derived from high speed end mills at appropriate speeds while eliminating the loss from breakage of end mills incurred by their use on low speed machines.

The attachment is powered by a ½ h.p. repulsion-induction type 110 or 220

"Stark"

"ELECTROBLAST"

High Speed Heat in 20 Minutes



Powerful torch used separately as a very handy portable flame, $30. High Speed Muffle Furnace, no scaling or decarburization, reaches high speed heat in 20 minutes at 7c per hour: quickly saves its cost. Muffle 7"x3½"x2½", $40. Also a larger furnace with built-in torch, muffle 7"x4½"x3½".

STARK TOOL CO.

Originators of the American Bench Lathe

Est. 1862 Waltham, Mass.



QUALITY BUILT TO GIVE LONGER FILING LIFE!

ALSO FOR SAWING AND STONING

Forced feed lubrication plus hardened and ground shafts running in bronze bushings combine to minimize wear in the ILLINOIS Die Filing Machine. Shop men using it daily know that an ILLINOIS stands up longer . . . yet continues to produce highly accurate filing, sawing and stoning work. Write for descriptive literature today.

ILLINOIS TOOL WORKS

2501 N. Keeler Avenue Chicago

ILLINOIS

DIE FILING MACHINE



When you use a

STERLING

SPEED-BLOC

SANDER

Hand sanding, like any other hand work, is COSTLY. You can now reduce production costs by using a Sterling for YOUR sanding. It will show savings up to 75% in labor and material costs. Equally efficient on metal, wood, or composition materials, for either wet or dry sanding or rubbing—on flat or curved surfaces. Does better work faster and more economically.

Pays for itself in 3 months

Ask us to demonstrate the Sterling on your own work. No obligation.

Send for illustrated folder

Sterling Products Co.

2473 Woodward, Detroit, Mich.

3380 Robertson Blvd., Los Angeles, Calif.



KNOCK-OUT Reamer and Cutter Grinder

Here is one machine that is still within the range of your pocket book.

$307.50



Outstanding! Why?

At the astonishingly low price of $307.50 you can buy this Universal Tool that will do any kind of a tool sharpening job encountered in the average shop, such as milling cutters, reamers, taps, end mills, metal slitting saws, carboloy bits, etc. And what is most important of all, you can do the work in approximately one-half the time required on large machines costing from 3 to 5 times as much. Even if you have a Universal cutter grinder now, you cannot afford to tie up a big expensive machine for the average small sharpening job.

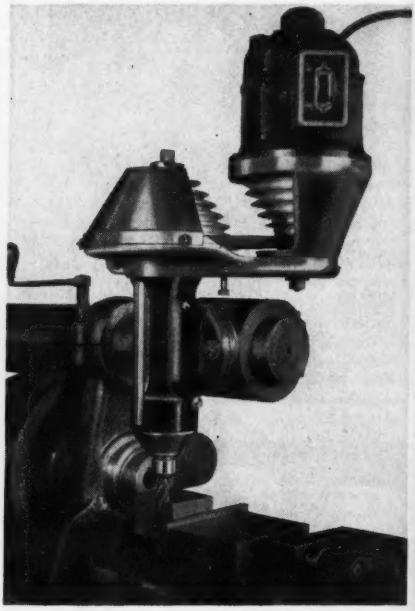
This machine is so simple and easy to operate, and involves such a nominal investment, that it is economical to install one in each tool crib instead of routing all sharpening jobs to one main tool room.

The K-O Grinder can be used to advantage in many manufacturing operations. It is easy to attach special holding fixtures. The machine can be purchased without attachments if desired.

Ask for bulletin RG39M.

K. O. LEE & SON CO.
Aberdeen, So. Dak.
"practical tools for practical men"
KNOCK-OUT

volt A.C. motor, 60 cycle, single phase, 1,725 r.p.m. and easily reversible for left hand end mills. A thermostatic motor switch is provided for overload protection. The spindle, which is hardened and ground all over, is 15½ in. long with a 21/32-in. hole through the center. The spindle housing is 3⅞-in. diameter and the bearings are spaced 9½ in. apart. Spindle speeds are 375, 650, 975, 1,430,

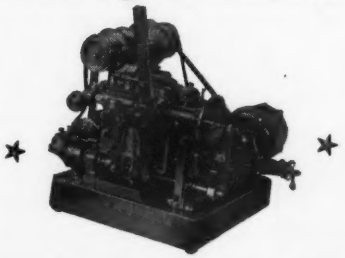


Rusnok Vertical Milling Attachment

2,075, and 3,000 r.p.m. The pulleys are of machined aluminum, with six steps. Power is transmitted by a ½ x 32-in. V-belt running on pulleys with a center distance of 8½ inches.

The motor mounting bracket is of aluminum and is machined. The bracket swings in a full circle and locks in any position around the spindle housing. The overarm bracket is in two sizes: No. 1, for round overarms from 3¼ to 3¾ in. diameter, and the No. 2, for overarms from 3¾ to 4¾ in. Spindle housing and motor bracket weigh, complete, 70 lbs. Standard equipment includes ½ h.p. motor, thermostatic switch, 9 ft. of lead cord and plug, a ½ in. end mill holder with wrench, ¾ x ⅞-in. end wrench, and ⅝-in. socket screw wrench.

"Waltham" Pinion Cutting Machines



Are made with a variety of equipments. They will make the two or three successive cuts needed for watch pinions or may be used for fine pitch gears up to 1½" diameter. There is also a 4" size. If you will describe your work we will send details.

Waltham Machine Works
WALTHAM, MASS.

Why Use A Shaper to cut Keyways when a DAVIS KEYSEATER will do the job so much quicker and better?



Send for Circular

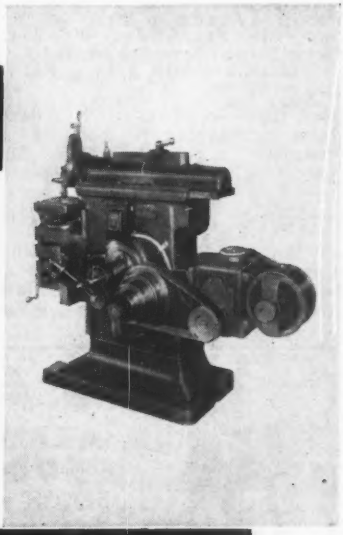
DAVIS KEYSEATER CO.
Exchange and Glasgow Sts.
ROCHESTER, N. Y.

Modernize with

FLEXOID SPEED CONTROL

A Revolutionary 4 Speed Control Unit

The Flexoid 4 speed control combines all the advantages of motorized control for machine tools in one compact, fool-proof, self-contained unit. A single hand control — at remote position if desired — operates all ratios with neutral position between changes. All hardened gears... ball bearing ... parallel input and output alloy shafts... rigid, solid construction ... all housed in one case ... motor mounted on unit. Write for descriptive data and prices.



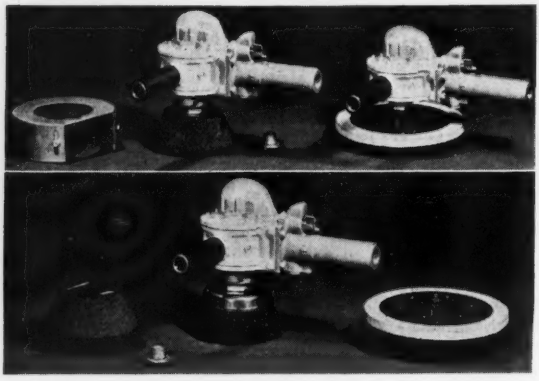
The Smith Power Transmission Co.
410 LAKESIDE AVE., N. W., CLEVELAND, OHIO

Rotor B-1-X and B-3-X Vertical Type Portable Grinders

The Rotor Tool Company, 17325 Euclid Ave., Cleveland, Ohio, has announced two vertical types of air grinders; the Nos. B-1-X and B-3-X. A number of outstanding features are claimed for these two machines, among which is the fact that the power of both models has been increased more than 40 per cent compared to preceding types. Maximum power is developed with less than 10 per cent drop in the free speed, thus making possible a high load speed for fast cutting action of the grinding wheel or sanding disc. Both grinders employ 6 x 4 x 5/8-in. cup wheels for grinding wells, castings, and so on. A 9-in. flexible pad is used for disc sanding, or a 6-in. cup brush for wire brushing.

The manufacturer claims that the tool is exceptionally well balanced with the two handles 90 deg. apart for easy control. The large area of contact of the abrasive members ensures rapid production combined with ease of operation. The B-1-X grinder weighs 10 lbs. and the B-3-X grinder weighs 12½ lbs. A new Rotor balanced multi-port governor controls maximum speed within the limits of the Safety Code by compressed spring action which is not affected by changes in air pressures.

It is stated that the vertical type of tool such as the B-1-X and B-3-X is especially adapted for flat or irregular surfaces and will increase metal removal by 33 to 50 per cent over the preceding models and by 50 to 100 per cent over older types of equipment.



(Above) Guard, Rotor B-3-X Vertical Type Portable Grinder with Flared Cup Wheel and Nut, and B-1-X Grinder with 9-In. Pad. (Below) Flared Cup Wheel for B-3-X Rotor Vertical Type Grinder, B-3-X Grinder with Cup Wire Brush, and 9-In. Sanding Pad for B-3-X Grinder.

Llewellen Variable Speed Transmission for Winding Strip Metal

The illustration shows a special variable speed Llewellen transmission with electrical control which was designed to meet the need for a method of maintaining uniform tension in winding strip metal. The winding reel starts at its highest speed. As the strip of material on the spool increase in diameter, the control accurately reduces the speed of the reel to maintain uniform tension on the strip as it is wound. After the reel



-FAMCO-
ARBOR PRESSES
FOOT PRESSES
BENCH and FLOOR MODELS
Write for catalog
FAMCO MACHINE COMPANY
1324 18th St. Racine, Wis.



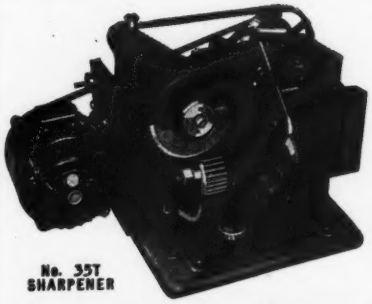
NEAT STAMPING in NAME PLATES



This machine quickly stamps details and serial numbers into name plates.

Write for Particulars

GEO. T. SCHMIDT, Inc.
1806 Belle Plaine Ave. Chicago, Ill.



No. 35T SHARPENER

AUTOMATICALLY SHARPENS METAL SAWS IN GANGS

Up to 5½" diameter and up to 1¾" thickness. 100 SAWS of 26 GAUGE CAN BE SHARPENED AT ONE TIME.

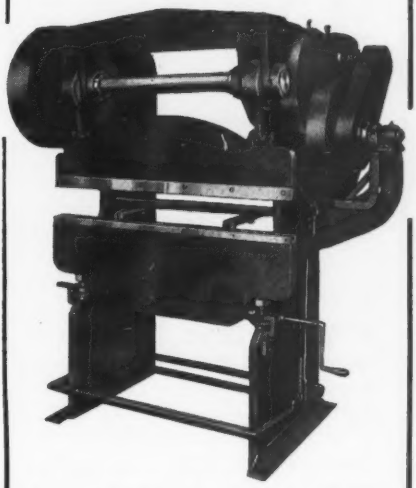
The saws are automatically indexed and sharpened within a variation of plus or minus .001 of exact diameter of entire lot.

WRITE FOR CIRCULAR

THE WARDWELL MFG. CO.
3168 Fulton Rd. Cleveland, O.

CHICAGO STEEL PRESS

No. 253



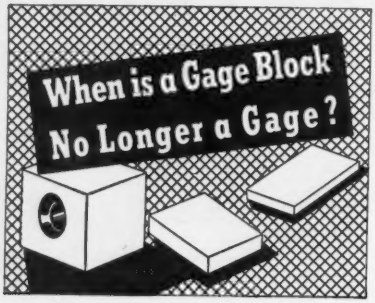
does 40% to 60% of the forming work turned out by the average shop.

Here's a profitable, economical brake idealy adapted for rapidly forming metal sections such as in stoves, refrigerators, soda fountains, steel cabinets, metal furniture, steel boxes, and a great variety of sheet metal specialties. Its variable speed drive operates from 17 to 50 strokes per minute. The No. 253 CHICAGO STEEL PRESS is accurate, compact, and ruggedly constructed of highest quality materials.

Sizes 4, 5 and 6 ft. capacities up to 10 gauge.

Write for Circular No. 253

DREIS & KRUMP MFG. Company
7418 LOOMIS BLVD.
CHICAGO ILLINOIS



• AN ENGINEER
RECENTLY SAID,

• "A Gage Block, worn more than ten-millionths of an inch is no longer a gage."

• Modern precision requirements were the basis of this remark.

• CHROME PLATED Standards will maintain this accuracy at a fraction of the cost of steel.

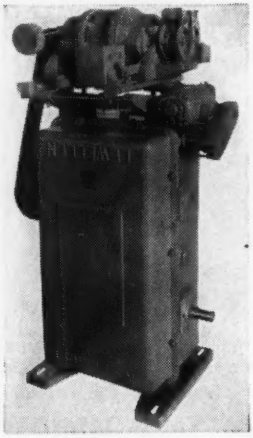
YOUR OLD GAGE BLOCKS Reconditioned with Chrome Plate, will give you original accuracies

DEARBORN GAGE COMPANY

"Originators of Chromium Plated Gage Blocks"

22035 Beech Street
DEARBORN - MICHIGAN

has filled and the unit has stopped so that a new core can be placed in the machine, the control reverses its position to allow the new reel to start again at maximum speed, decreasing again in

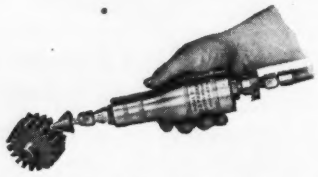


Llewellen Variable Speed Transmission with Electrical Controls for Maintaining Uniform Tension in Winding Strip Metal

speed as it is filled. The transmission is built by Llewellen Manufacturing Co., 1055 E. 10th St., Columbus, Indiana.

M-B Utility Model U-TR Pneumatic Grinder

The illustration shows the Model U-TR Pneumatic Grinder now offered by M-B Products, 130 E. Larned St., De-



M-B Utility Model U-TR Pneumatic Grinder

troit, Mich. The tool is of streamlined design, housed in a steel housing, and is said to be built for hard work and tough jobs on the production line. It is said to have an abundance of power and op-

COST CUTTING TOOLS

GROUND RADIAL RELIEF



CIRCLE "R"

Combination Center Drills

Will give more production at less cost. Be sure to demand Circle "R" Tools.

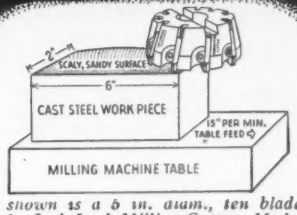
Send for Catalog "K"

CIRCULAR TOOL CO., Inc.

PROVIDENCE • RHODE ISLAND

BRANCHES—Chicago, Detroit, Indianapolis, Philadelphia, Cleveland, New York

MILLING SCALY STEEL CASTINGS *with* KENNAMETAL



Cutter shown is a 6 in. diam., ten blade, McCrosky Jack-Lock Milling Cutter. Made by McCrosky Tool Corp., Meadville, Pa.

MACHINES 15 TO 30 TIMES MORE PIECES IN 1/6 THE TIME PER PIECE

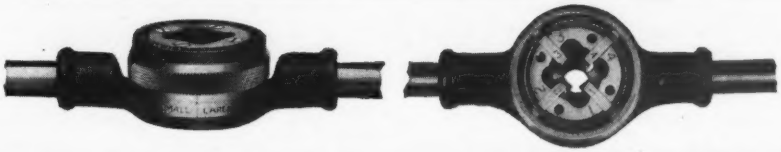
TYPE OF BLADE	PIECES PER GRIND	MILLING TIME PER PIECE
KENNAMETAL-tipped	500	Less than ½ min.
High Speed Steel	10 to 20	3 minutes

The above tests were made on *scaly, sandy, hard* cast steel, yet there was no breakage of the KENNAMETAL-tipped blades. Results shown in the table are typical of the increased production made possible by KENNAMETAL. Write for complete information today.

McKENNA METALS Co.

300 LLOYD AVENUE

LATROBE, PENNSYLVANIA, U.S.A.



IDEAL SMALL BOLT THREADERS

WITH PERFECTED DIE ADJUSTMENT

Easy cutting. Long die life. Good threads. Simple, positive adjustment. The knurled sizing ring does the trick. All four die segments move in or out an equal distance. "TOLEDO" No. 101 threads ¼" to ⅝". No. 102 threads ½" to 1". Fill in the coupon and mail it today.

THE TOLEDO PIPE THREADING MACHINE CO. • Toledo, O.

New York Office, 72 Lafayette St.

SEND ME INFORMATION ON THE NEW "TOLEDO" ADJ. BOLT STOCKS

NAME.....

STREET.....

CITY.....

STATE.....

"TOLEDO"

YOU'LL DO BETTER WITH A "TOLEDO"

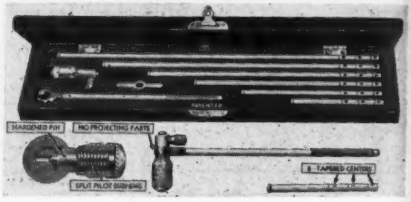
erates at speeds as high as 60,000 r.p.m.

The spindle is of special alloy steel, heat treated and ground to close limits, and is of extra heavy construction. The spindle accommodates mounted grinding wheels, cutters, rotary files, and similar tools with ¼-in. diameter shanks. The weight of the unit is 2¼ lbs., the length of the body is 5⅝ in., and the overall length is 9 in. Special grease sealed bearings are employed, eliminating the problem of lubrication entirely.

Three stages of impulsion make possible maximum power for the size and speed of the tool. It is said to be cool in operation, with no heating. Supplied as standard equipment are a hose line 8 ft. long and fitted with a dirt filter, two drop-forged wrenches, and four mounted grinding wheels, all packed with the grinder in a fine solid oak case. A tool post adapter for using the tool for either stationary or internal grinding operations is furnished extra.

International Inside Micrometer

The illustration shows an inside micrometer which is now being marketed by Pacific Specialty Supply Company, 344 N. Vermont Ave., Los Angeles, Cal. The outstanding feature of the International Inside Micrometer is its quick set-

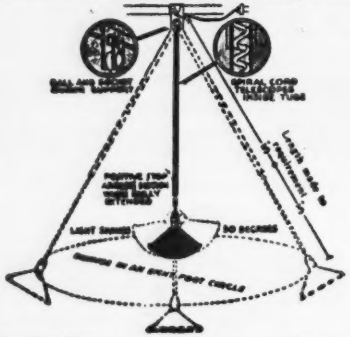


International Inside Micrometer

ting, due to the method used in locating the measuring rods. Each rod is marked with its own length and is held to the head by means of a locating screw which screws into a center on the rod. The centers can easily be located by means of lines on the rod. The locating screw has a hardened tool steel point and is locked in position by means of a split pilot bushing. Each rod has three centers spaced ½ in. apart, to the highest degree of accuracy, providing a range of 1½ in. to the rod and minimiz-

UNIVERSAL MOVABLE LIGHT

For Machine Shop and Drafting Board



NO GLARE . . . Push it up . . . pull it down . . . swing it out . . . swing it around . . . *and it stays put.*

Avoid strong illumination causing headache.

WRITE FOR LITERATURE.

J. ZAGORA MACHINE & GEAR CO.

1325 South Mint St. Charlotte, N. C.

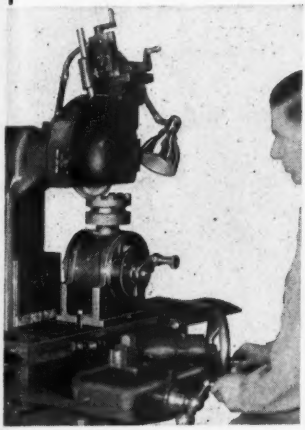
STAPLES *Solid* Carboloy-Tipped Reamers



Produce up to fifty times as many smooth, accurate holes without resharpening when compared to high speed steel reamers. Their cost is surprisingly low. Write for price schedule. Sold through Carboloy Company or direct.

STAPLES TOOL & ENGINEERING CO. CINCINNATI · OHIO ·

SKILLED MEN DESERVE



VIMCOLIGHTS

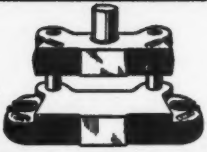
OTHER MEN NEED THEM

VIMCOLIGHT on Covel Mfg. Company's grinder. *Write for details.*

VIMCO MFG. CO. INC.

111 CHENANGO ST. BUFFALO, N. Y.

BAUMBACH



STANDARDIZED DIE SETS

Machined Steel

Semi-Steel

DROP FORGED STEEL

Standardized Die Sets, embodying many exclusive features, a listing of more than 185,000 stock sizes and 46 different styles afford a service that is unsurpassed.

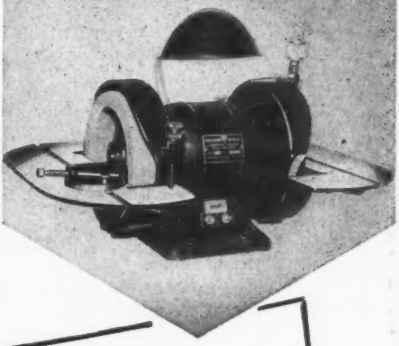
Send for Our New 288-Page Catalog

E. A. BAUMBACH MFG. CO.

1806 S. Kilbourne Ave. Chicago, Ill.

PROSSER

Cemented Carbide Tool Grinder



$97.50 COMPLETE

10 DAYS FREE TRIAL

Try this grinder for 10 days at our expense to convince yourself that it will increase your tool life and reduce tool breakage — and pay for itself in practically no time at all.

- Removes metal **FAST** when rough grinding.
- Finish grinds **KEEN, SMOOTH** cutting edges.

Write for details

Thomas Prosser & Son

120 WALL ST. • NEW YORK

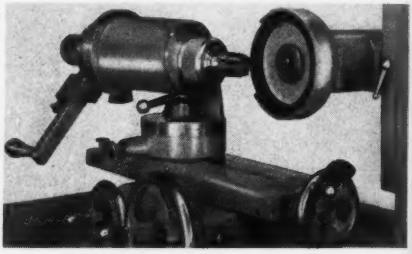
ing rod changing. The centers continue through the rod and are easily kept clean.

The extra long extension handle is quickly and easily attached to the micrometer head, the construction being such that the instrument can be used in blind holes and similar places. The micrometer is made in two sets: 1½ in. to 6 in. and 1½ in. to 12 in. Each set is packed in a nicely finished hardwood case and is guaranteed for accuracy, workmanship, and material.

Bergram RG-1 Tap Relief Grinding Head

Illustrated herewith is a Bergram RG-1 Tap Relief Grinding Head mounted on a Bergram Utility Grinder with cup wheel. The device is a product of Bergram Mechanical Engineering Co., Inc., 18 Hartford Ave., New Britain, Conn. With this head, the ends of flutes can be relieved at any selected angle by eccentric setting. Collet capacity up to 1⅜-in. diameter is obtainable. The spindle and draw tube are hollow, permitting the shank to be inserted up to the flutes. Grinding stops are adjustable for right or left hand taps.

Index plate used with this head is interchangeable with 24 notches in one plate and 5 and 7 in the other, thus providing for any number of flutes from 2 through 8. Other numbers are special. Suitable brackets are available for mounting the head on universal or surface grinders of various makes.

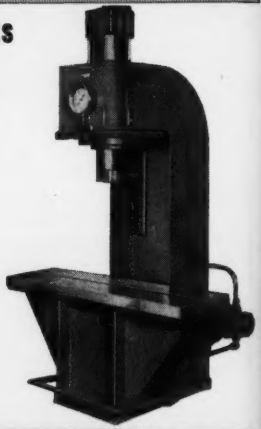


Bergram RG-1 Tap Relief Grinding Head

LET DENISON SOLVE YOUR SPECIAL MACHINERY PROBLEMS !

NEW, ECONOMICAL HYDRAULIC PRESSES
For All Smaller Press Jobs

A completely new series of rugged, dependable hydraulic presses at low cost—for small-capacity straightening, assembling, broaching or other press jobs. Denison's long experience in designing special hydraulic presses has enabled them to build maximum operating efficiency into this new standard-type series. 5- to 50-ton working capacities; 26" stroke; 29" maximum vertical opening. They are compact, complete; only power connections and oil for the reservoir are required to put these presses into operation. You'll want details on these money-saving presses. Write today for special bulletins No. 101 and 102.



DENISON Engineering Company
103 WEST CHESTNUT STREET COLUMBUS, OHIO

SCHAUER Speed Lathes

PRODUCTION NECESSITIES

TIME SAVERS IN ANY PLANT



Designed especially for reducing time of secondary operations as lapping, polishing, filing, finishing and burring of small parts. Equipped with 2 speed motor—automatic brake—collets or 3 jaw chucks—hand operated or automatic. Many interesting applications shown in Clr. No. 380 —Write for it.

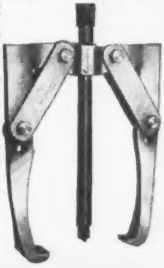
SCHAUER MACHINE CO.
2060 READING RD., CINCINNATI, OHIO

OTC PULLING SYSTEM

Capacities — 5 to 40 TONS

for PLANT MAINTENANCE

The safe, efficient way to remove and replace bearings, gears, wheels, shafts, pulleys, etc. OTC GRIPOMATIC PULLERS (with patented grip) prevent slipping, avoid damage, simplify work in close quarters. SPECIAL PULLERS designed for special needs.



WRITE FOR CATALOG MS.

OWATONNA TOOL CO.
357 CEDAR ST. OWATONNA, MINN.



MAC-ITS Save on Production, Maintenance and Design!

Stronger, more accurate screws can end many tie-ups—save labor and replacements—and cut costs all along the line when your designs take advantage of their greater strength.

Mac-its give you all these savings in 16 standard items. For complete details, call your Mac-it distributor or write today for your copy of Catalog 38, listing the only complete line of heat-treated, alloy steel screws!

THE STRONG, CARLISLE & HAMMOND CO.
1392 West Third St., Cleveland · Ohio

Reduce Your Die Costs with

HY-TEN "M"
TEMPER
ALLOY STEEL

● .70 Carbon Cr-Ni-Moly
Oil Hardening.

Rounds, Squares, Flats
for Immediate Shipment.

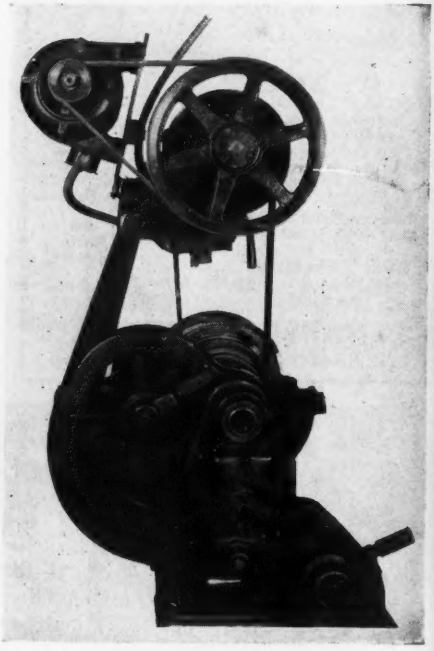


Write for Free Copy of Steel Users' Data Sheets.

WHEELOCK. LOVEJOY & CO., INC.
130 SIDNEY ST. • CAMBRIDGE, MASS.
Cleveland • Chicago • Newark
Cincinnati • Detroit • Buffalo

Production Type 200 Motor Drive

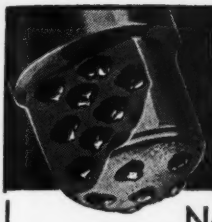
Shown herewith is the Type 200 Motor Drive now being built by The Production Equipment Co., 5219 Chester Ave., Cleveland, Ohio. The drive is of the V-belt type, all steel construction, and designed to be supported on a box-type



Production 3 H.P. 280 R.P.M. Type 200 Drive Mounted on 20-In. Lathe

column made to fit the dimensions of the driven machine. A standard ball bearing motor is used, mounted on a pivoted motor base, to aid in adjustment of the V-belt. The drive shaft is mounted in sealed ball bearings.

The "Drive Only" consists of a column support, two arms with ball bearing mountings adjustable for drive shaft alignment, a drive shaft designed to meet the dimensions of the driving cone pulley, a V-belt with two sheaves, pivoted motor base, and ratchet adjustment for flat belt. The drive shown in the illustration is a Type 200, 3 h.p., 280



Free Cutting!
Non-Glazing!
Abuse Proof!

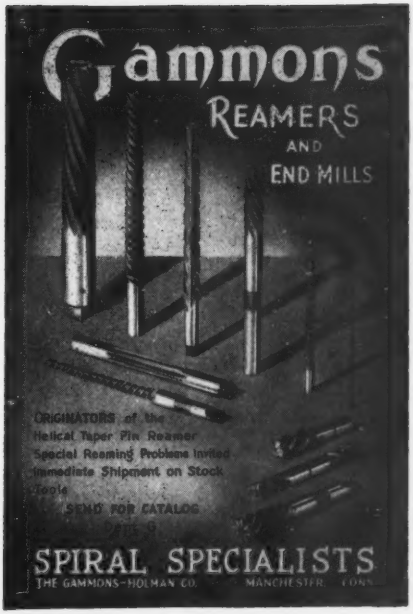
New WTTCo
Diamond Impregnated
WHEEL DRESSER

Whole, unbroken diamonds of high quality and extreme toughness are spaced regularly throughout the matrix to give great accuracy, uniform dressings and to hold wheel to size. These stones are anchored permanently in their matrix by strong chemical bonds that will not break under heat, pressure or rough abuse. No remounting! Lowered costs! After tool is put in machine it will give best results if left in original position. It is not necessary to turn or alter the area in contact with the grinding wheel.

Send for literature and prices.

WHEEL TRUEING TOOL CO., INC.
3200 W. Davison • Detroit

In Canada: 575 Langlois, Windsor, Ont.



INTEGRITY!

T R & S Rivets are the last word in dependability and uniformity. And they're backed by the long-established integrity of the Tubular Rivet and Stud Company. So remember — for complete confidence in your production charts — specify only T R & S Rivets.

TUBULAR RIVET & STUD CO.

World's Largest Manufacturer of Tubular and Split Rivets

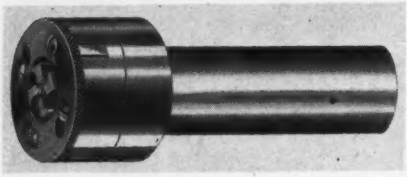
WOLLASTON, MASSACHUSETTS

R&S Co

r.p.m., mounted for driving a 20-in. lathe.

Geometric EJ5 Die Head

To the EJ line of Geometric Solid Adjustable Die Heads made by The Geometric Tool Company, New Haven, Conn., has been added the EJ5 Die Head, designed for producing screw threads from No. 0 to No. 10 in threads up to 100 per inch. Only one inch in diameter, the tool is said to be rugged, while weighing less than five ounces complete with chasers.



Geometric EJ5 Die Head

The EJ5 is a small, four chaser, solid adjustable die head. The chasers are adjustable within the die head, thus allowing production to the exact decimal fit desired. The chasers may be quickly removed for resharpening by removing the faceplate, which is held in place by means of an application of the bayonet lock principle. Incidentally, projection (overhanging) chasers of high speed steel are furnished as standard, thus facilitating shoulder threading and at the same time bringing the chasers out beyond the faceplate for ease in setting up.

The head is equipped as standard with a non-releasing floating shank, providing a forward float which allows for an even start and makes possible the production of accurate threads on small diameters and of fine pitches without the use of accurate camming. The head can be set up on a B. & S. Automatic that has been cammed for the usual types of solid dies with holders, without the necessity of changing cams.

Kennametal-Tipped Milling Cutters

McKenna Metals Co., 300 Lloyd Ave., Latrobe, Pa., announces a series of milling cutters equipped with Kenna-

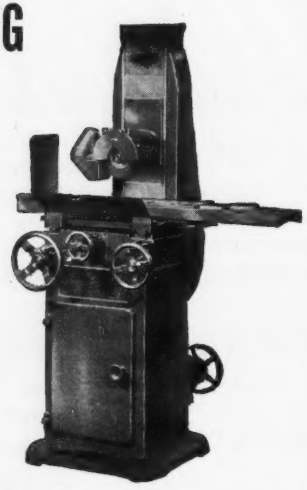
FOR ODD-LOT GRINDING

REID HAND-FEED SURFACE GRINDER

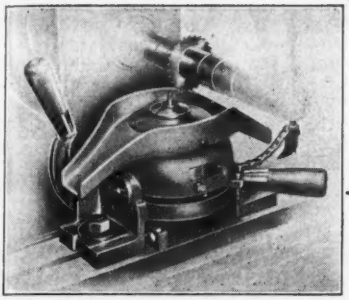
Head elevating hand wheel at the right of table feed hand wheels provides ease of operation without loss of motion.

All bearing surfaces adequately protected by telescoping dust guards, rigidly attached to column. Designed for accuracy and operator's convenience.

Write for Catalog No. 2-A.



REID BROTHERS CO., INC. BEVERLY, MASS., U. S. A.



DEARBORN Automatic Chucking and Indexing Fixture

MILLS OVER 1000 PARTS PER HOUR

Work held by draw in collets. Collets open and close automatically. Work automatically ejected. Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces. Minimum set-up time required. Speeds up production. Positive and accurate in operation.

J. W. DEARBORN

70 S. CLIFF ST. • ANSONIA, CONN.

SMALL GEARS

—in the finer Pitches—14 to 96 D. P.

SPURS **WORM-**
SPIRALS **GEARING**
HELICALS **RACKS**
BEVELS **RATCHETS**

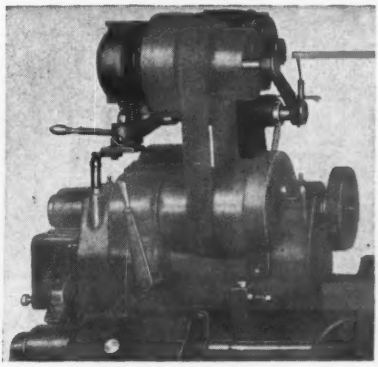
High precision or commercial production. A few pieces or a million.

You can **SAFELY** entrust your Gear purchases to this exceptionally well equipped and organized plant.

Made to Order Only—No stock—No Catalog

Gear Specialties
INCORPORATED
CHICAGO

2620 W. Medill Ave. **Phone - Humboldt 3482**



Modernize

Your Machines With

Cullman Drives

Your Lathes, Shapers, Milling Machines and other belt driven machines can now be easily motorized with direct drives.

Cullman Drives are rigidly constructed, easily installed and simple to operate.

Made for motors from ¼ to 15 H.P.

SEND FOR INFORMATION

CULLMAN WHEEL CO.

1336 Altgeld St., Chicago, Ill.

Now Available

3 NEW

BODY SIZES OF PRESS FIT BUSHINGS CONFORMING TO LATEST A. S. A. REQUIREMENTS.

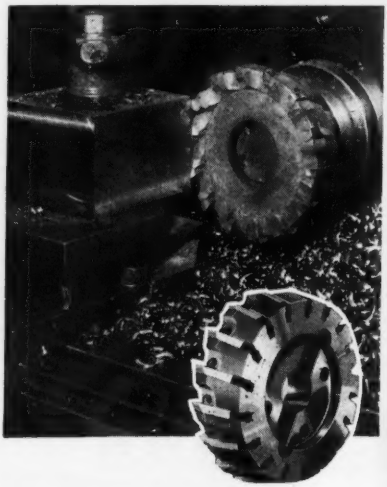


Three new sizes now complete the standard line of Universal quality drill bushings. All Universals have rust proof black domes and superfinished bores assuring concentricity and unexcelled wearing qualities. Write for facts.

UNIVERSAL
Engineering Company
Frankenmuth, Mich.

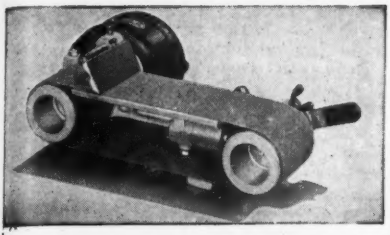
metal-tipped blades, which have been developed in cooperation with the McCrosky Tool Corp., Meadville, Pa. The fast machining speeds and wear resistance found in Kennametal-tipped single point cutting tools are also characteristic of the new milling cutters.

In the job illustrated, the 7-in. diameter standard McCrosky Jack-Lock Shell End Mill tipped with Kennametal Grade KM is milling an S.A.E. 4150 steel forging that was heat treated before machining to a hardness ranging from 28 to 32 Rockwell C. The cutter is run at 92 r.p.m. The feed is 3⅝ in. per minute and the depth of cut is 0.125 in. An average of 160 faces were milled before regrinding was necessary.



Kennametal-Tipped Milling Cutters

The series comprises nine standard sizes in each of the following types of cutters: medium duty face mills, heavy duty face mills, and shell end mills. Incorporated in these milling cutters are exclusive features developed by McCrosky engineers which are said to be particularly advantageous when using blades tipped with hard carbide material, Kennametal. The Jack-Lock Wedge locks the blade with extreme rigidity and may be locked and unlocked without pounding, thus avoiding damage to the blades. In addition, the special adjusting screw in back of each blade permits fine and accurate forward adjustment that holds to a minimum the



•NEW An Inexpensive ABRASIVE BAND GRINDER..

"Built Like a Machine Tool"

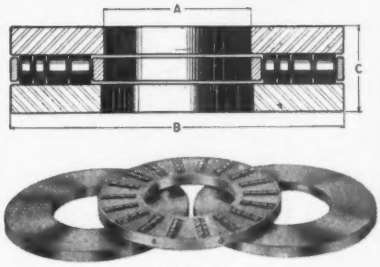
The Hormel-M Grinder is sturdily built with a supporting leg under the grinding table to eliminate vibration and tipping due to pressure on the belt. Ball bearing throughout. Equipped with ALEMITE LUBRICATION complete with grease gun.

Write for illustrated folder on this and other styles and sizes.

HORMEL-M GRINDER

WALLS SALES CORP.
96 WARREN ST. NEW YORK, N. Y.

GWILLIAM



TYPE RT

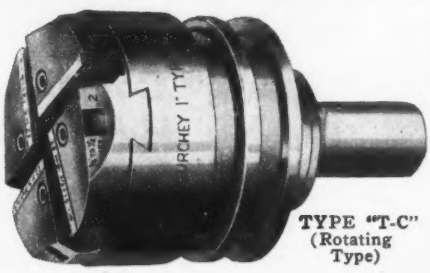
ROLLER THRUST BEARINGS

• Made with flat seats and in a variety of self-aligning types.
These bearings are especially adapted for *heavy loads* at slow or moderate speeds.

Standard sizes are shown in our general catalog, sent upon request.

THE GWILLIAM CO.

358 FURMAN ST., BROOKLYN, N. Y.



TYPE "T-C"
(Rotating Type)

MURCHEY TANGENT CHASER SELF-OPENING DIE HEADS

Designed to use Tangential Chasers, these hardened and ground heads will cut extremely accurate threads on long production runs.
Tangential Chasers give long life, permanent throat, accuracy, and interchangeability of chasers.
Positive opening and accurate closing is accomplished by four rugged cam prongs. Write for bulletin.
Furnished in the Rotating or Non-rotating Types.

MURCHEY MACHINE & TOOL CO. DETROIT MICH.

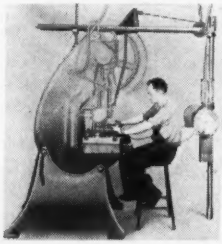
Murchey also manufactures all styles of self-opening die heads, collapsible taps and bolt and pipe threading machines.

amount of expensive carbide material which must be removed to align all blades when regrinding. Blades may be moved forward as little as 0.002 in. These design features are shown in the 18-blade facing mill illustrated.

Universal Punch Press Guard

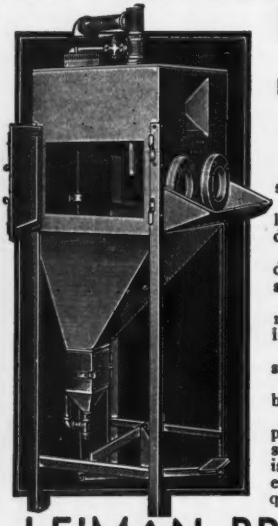
To eliminate hand accidents which have in the past been so prevalent in stamping press work, Grand Haven Stamped Products Co., Grand Haven, Mich., has developed a guard which is applied to the operator instead of the machine and which will make it impossible for the operator's hands to remain in the danger zone while the machine is in operation. Although designed primarily for punch presses, it can be applied to practically any type of ram-action machine, including spot welders.

The guard consists primarily of a single cable which is attached to the ram of the machine at one end and is divided at the other end to make two cables which are attached to the operator's wrists. Extending back from the machine either side of the operator, the two cables travel over two wheels at the rear of the operator and thence upward over pulleys which make it possible for the cables to work smoothly and efficiently without getting in the way or interfering with the movements of the operator or the machine.



Universal Punch Press Guard Applied to Stamping Press

When the ram descends, the cable is pulled accordingly and unless the operator has previously moved his hands back out of the danger zone, they are jerked back by the cables. As the ram ascends again, the cable is fed back to-



REMOVE HARDENING SCALE

WITH

LEIMAN BROS. (PATENTED) Continuous Feed

SAND BLAST OUTFIT

It furnishes a modern, cleanly way of cleaning moulding sand from patterns and castings. Letters and designs stenciled.

Will replace the scratch brush for mat finishing and similar effects on all classes of goods—it will replace the use of disagreeable acids for this work.

Finishes may be fine, medium or coarse on all materials as desired—but, most important, it will always be uniform—no streaky, uneven results.

Any article to be plated should be sand blasted first—it will result in a more permanent plate, a quicker plate, and a saving of time in plating and a saving of current.

The most inexperienced person can operate it without instructions—the work cannot be spoiled.

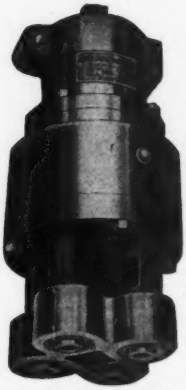
Metal goods of every kind and description should be sand blasted to increase plating durability.

The sand blasting process makes a surface to which electro plate will adhere more securely and much more rapidly and so sand blasting saves time in plating, and improves your finish. This also applies to articles to be painted, sprayed, enameled or otherwise treated. Mat finishes of various degrees are quickly secured.

LEIMAN BROS., Inc. 4W-23 WALKER ST. NEW YORK CITY

MAKERS OF GOOD MACHINERY FOR 50 YEARS

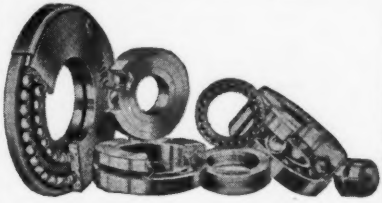
U. S. SPECIAL DRILL HEADS



U. S. Drill Heads are made in standard and special sizes. If your job requires special drill heads, our years of specialization in this work will save you money and assure an accurate dependable and swift job. Send your blue prints for estimates.

The United States Drill Head Co.
1954 Riverside Drive
CINCINNATI, OHIO

AUBURN SPECIAL BALL BEARINGS



MADE TO ORDER

Auburn Special Ball Bearings are made to customer's dimensions or to answer specified service conditions. Send details of your problem and get the Auburn Answer.

Write for Catalog.

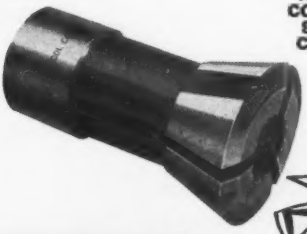
AUBURN BALL BEARING CO.
69 CLARISSA ST., ROCHESTER, N. Y.

SURER GRIP NO SLIPPAGE



YOU CAN REST ASSURED that slippage will not spoil your production record if your screw machines are equipped with Sutton DIAMOND-GRIP Collets. Their clean-cut diamond-shaped serrations attack both horizontal and rotating thrusts at an angle. This surer grip is your protection.

ASK FOR COMPLETE SUTTON CATALOG





SUTTON DIAMOND-GRIP COLLETS

SUTTON TOOL CO.
2895 W. Grand Blvd. Detroit, Mich.

Accessories for Screw Machines

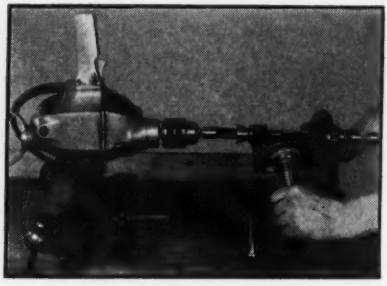
ward the operator, allowing him to remove the stamping and place a new piece in the press. The cables are adjustable according to the operator.

The wheels are supported by a vertical shaft and crossrail construction as shown in the illustration. The cables which attach to the wristlets are of cotton braid with wire rope centers and any wear can immediately be detected. All wearing points of the mechanism are equipped with ball bearings to eliminate any possibility of wear and the operating mechanism is adjustable for height to suit any press.

The structure is so designed that it can be raised out of the way, when required, thus making the space in front of the press available for installation of dies, or to allow the press to be used for blanking operations without the necessity of disconnecting the guard from the press.

Ammco Small Bore Hone

The illustration shows a hone designed for honing small holes or bores in small cylinders, bushings, and other holes which must be finished to close limits of accuracy and smoothness. Built by the Automotive Maintenance Machinery Co., 2100 Commonwealth Ave., North



Ammco Small Bore Hone

Chicago, Ill., the tool is of modern design, fast cutting and accurate.

The tool has an automatic centering cone, push expansion knob, and stop collar. The automatic centering cone maintains perfect alignment and permits the grinding of each boss separately. The stop collar can be set to limit expansion to any desired diameter, making it easy to finish all holes to exactly

BOYAR-SCHULTZ Profile Grinder



No. 1 Bench Model

Hundreds of users in America and abroad are saving time on expensive die and tool work that calls for grinding and fitting difficult shapes, contours and irregular profiles.

Not only is a great deal of time saved on these operations, but the quality of work turned out with Boyar-Schultz Profile Grinders is much better. Dies, tools and parts have that finished appearance that is the pride of the expert. Use the Bench Model for light work or the No. 2 Heavy Duty Model for larger and heavier work.

Write for Circulars giving full description and time saving possibilities.

BOYAR-SCHULTZ CORPORATION

2121 Walnut Street Chicago, Illinois

START 1940 RIGHT

by using

WALTON TAP EXTRACTORS



They remove taps broken at or below the surface of the hole easily, quickly and without injury to the threads.

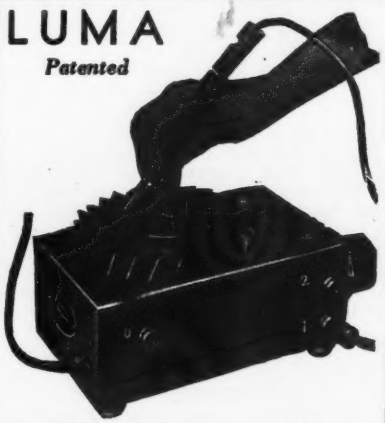
Send for Folder 132 giving sizes, styles and prices.

Test their worth by 30-day Free Trial.

The Walton Co.
98 ALLYN STREET
HARTFORD, CONN.

LUMA

Patented



Combination Demagnetizer and Electric Etching Pencil. Marks symbols in hardest steel. Demagnetizes instantly. One of our models popular in tool rooms for 15 years.

Luma Electric Equipment Co.
DEPT. MS TOLEDO, OHIO

GROUND
To Give Keenness

these Midget Cutters often give 7 to 10 times the increase in production per dollar of tool cost.

And what's more --- **Severance guarantees** that they will give from **3 to 5** TIMES more production per tool — and keep on doing it every time they are re-ground.



So! Cut Your

Rotary Filing costs like one *Chief Executive who writes, **"It will cut our tool costs at least three-quarters."**

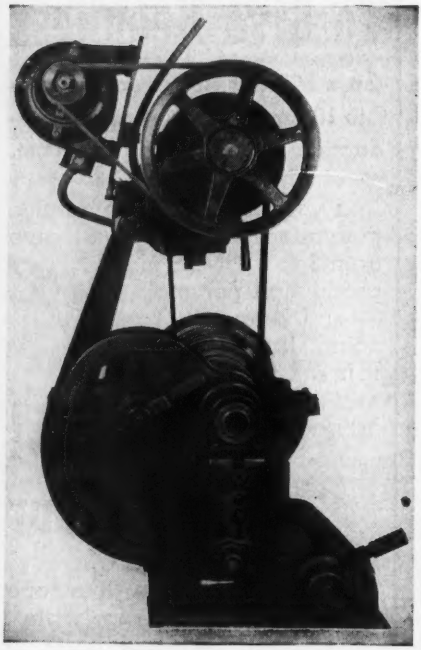
Write for Catalogue No. 12. Every Tool Man—Supervisor, Engineer or Designer — will want this little booklet, so pack full of time and money-saving ideas.

Profusely illustrated, it shows many unusual cutters and applications, lists Standard Midget Milling Cutters, "Chatterless" Countersinks, Tube Burring Cutters and Inside Burring Cutters as originated by

* Name on request.

Severance Tool Mfg. Co.
1516 E. Genesee Ave., Saginaw, Mich.

MOTORIZATION DRIVES



Type 200 ALL STEEL
3 H.P. 275 Rev. Lathe Drive

No one drive meets **all** requirements advantageously.

Be sure to choose the correct type for **your** application.

We offer:

V Belt Drives
Gear Motor Drives
4 Speed, Gear Box Drives.

Send us a list of your requirements and get unbiased recommendations.

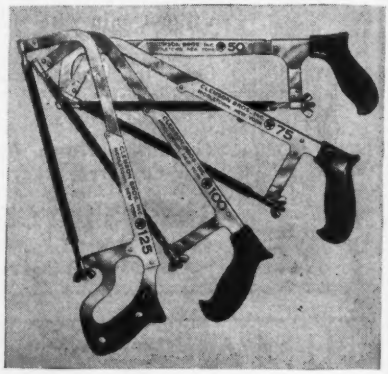
PRODUCTION EQUIPMENT CO.
5219 CHESTER AVE. CLEVELAND, OHIO

the same size. The push expansion knob leaves both hands of the mechanic free to hold the work and prevents over-grinding.

The tool is made in two sizes: No. 1, which has a range of 47/64 to 1 1/16 in., and the No. 2, with a range of 1 to 1 5/8 inches.

"Star" Hack Saw Frames

Clemson Bros., Inc., Middletown, N. Y., manufacturers of Star Tungsten and "Moly" hack saw blades, have introduced four types of hack saw frames particularly designed for Star blades.



"Star" Hack Saw Frames

All frames have exposed metal parts highly finished in polished and buffed nickel with comfortable black molded pistol-grip handles. All are adjustable for blades from 8 to 12 in. and permit facing blades four ways. The four types are listed as Nos. 50, 75, 100 and 125 respectively. The first three are sold with a Star tungsten blade, and the last with a Star "Moly" blade.

"New Method" Universal Marking Device

A universal marking device which permits marking directly on the outside diameter of shafts, rods, and so on, has been introduced by New Method Steel Stamps, Inc., 149 Jos. Campau St., Detroit, Mich. Designed for the optional use of solid or low cost individual type, the device consists of a type retainer and a guide holder.

TOOLS and GAGES



OUTSTANDING FOR

CRAFTSmanship!

Highest Precision Guaranteed

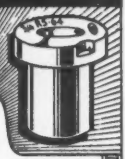
CARBOLOY-TIPPED TOOLS and GAGES
DIAMOND TOOLS and WEAR PARTS
If your problem is difficult, write:

ARTHUR A.
CRAFTS COMPANY, Inc.
532 Commonwealth Avenue, BOSTON
CHICAGO DETROIT NEWARK

ACME Standardized JIG BUSHINGS



Acme Standard over 6700 Items
A.S.A. Standard over 4200 Items



Acme Drill Jig Bushings are made by the most exacting, scientific methods — insuring long wear, accurate fit, and absolute satisfaction. A standardized product, carried in stock for prompt delivery in over 10,900 standard items—all completely finished and ready for use. Special sizes made to order.

SEND for BULLETIN CONTAINING COMPLETE DATA and LOW PRICES

Acme INDUSTRIAL Co.
212 N. LaFlin St. Chicago, Ill.

A CLAMP For Every Purpose







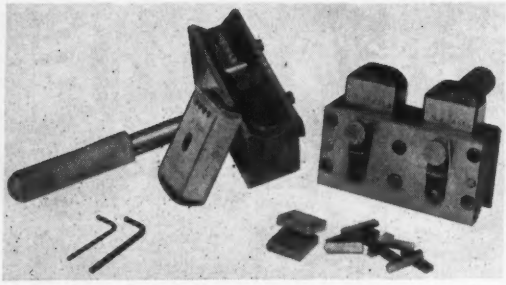
Forged Steel
Quick Acting
Deep Reach

Sizes Available:
¾" to 10" opening
½" to 9" deep

Write for CATALOG and PRICES on Clamps for all purposes as well as many other tools for use in the Machine Shop.

IN STOCK AT YOUR SUPPLY HOUSE

The Cincinnati Tool Co., 1947 WAVERLY AVE., CINCINNATI, OHIO



Universal Marking Device for Round Shafts

As shown in the illustration, the bottom of the guide holder is in the shape of a wide V, so proportioned that the sides of the V-guide will rest against virtually any round shaft, providing a support on both sides to positively align the type and ensure clear marking on center.

The type retainer floats in the guide, but its travel is limited by a pin in the guide extending into an elongated hole in the type retainer. Type retainers thus cannot drop out of the guide, yet have sufficient freedom of movement to rest directly on the shaft to be marked. Individual type is held in the retainer by means of set screws. To remove the type retainer from the holder, the pins are merely retracted against spring pressure by means of the knurled knobs shown. A hardened and ground anvil is provided in the type retainers to prevent type from "sinking."

Armstrong Miniature Reversible Ratchet

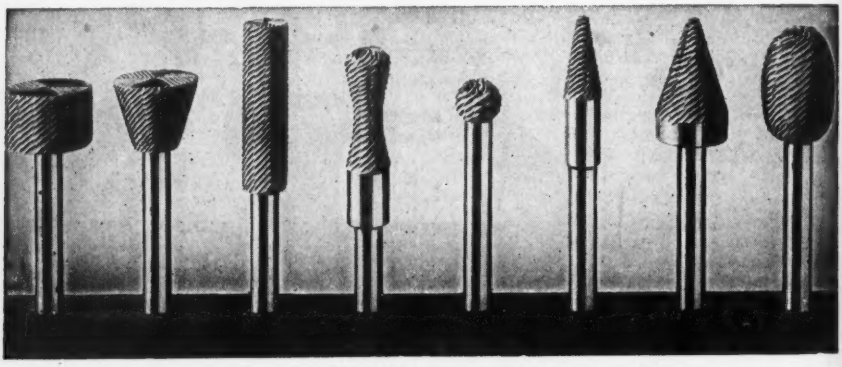
Armstrong Bros. Tool Co., 328 N. Francisco Ave., Chicago, Ill., announces a miniature reversible ratchet and four



Armstrong Miniature Reversible Ratchet

drivers for their miniature detachable head wrenches. The reversible ratchet,

FORD HAND CUT ROTARY FILES

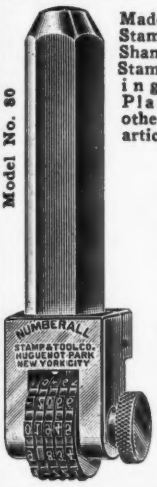


Just a few of the many standard shapes which are carried in stock.
Write for full information.

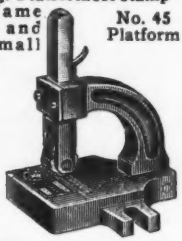
M. A. FORD MFG. CO.

408 PERSHING AVE. DAVENPORT, IOWA

Mark It Quickly *with a* NUMBERALL



Made with 1 to 10 wheels. Stamp in perfect alignment. Shank for Hand or Press Stamping. Platform for stamping Name Plates and other small articles.



No. 45 Platform

NEW Quick Set Machine. One wheel can be turned quickly by knurled knob for consecutive numbering.

NUMBERALL STAMP & TOOL CO.
Huguenot Park,
Staten Island, N. Y.

SHEAR-CUT END MILLS



Here's a complete line of **Single and Double End Mills.**
They save time and money.
Specify Progressive Shear-Cut End Mills.
Write for catalog and prices.

PROGRESSIVE TOOL & CUTTER CO.
2345 WOLCOTT ST. • FERNDALE, MICH.

WOOD & SPENCER



TAPS

STANDARD and SPECIAL

QUICK DELIVERY

The Wood & Spencer Co.
1910 E. 61st St.
CLEVELAND, OHIO

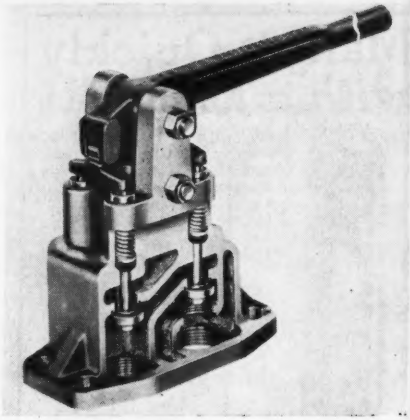
which is only 4 in. long, is machined from special chrome vanadium steel finished in chrome plate. The ratchet is of improved design with a hardened gear and instant reversing thumb switch.

The four miniature drivers added to this series are: flexible head handle; a screw-driven type extension spin-grip which permits locking the head so that it can be used also as a spinning extension, and long and short extensions.

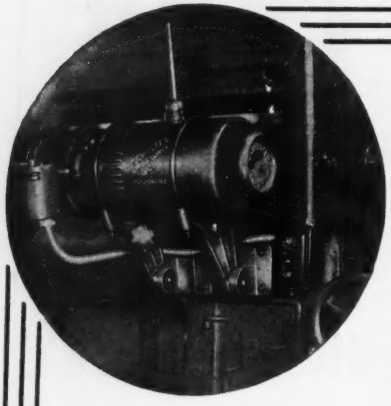
Ross Heavy Duty Air Control Valve

A heavy duty air control valve has been announced by Ross Operating Valve Company, 6484 Epworth Blvd., Detroit, Mich. The valve is a poppet type with the mounting flange, the uprights, lever and other parts engineered much heavier than the standard valves. A special alloy lever, rocker arm pins of increased diameter fitted with needle type roller bearings, larger stuffing boxes, stainless steel poppet stems and retainers, and other features provide extra strength and wear for the valve.

Mounting dimensions, pipe connection locations, and bolt holes in this heavy duty valve remain the same as in the standard type Ross valves, the design permitting mounting the valves on a bracket, a desirable feature which allows for quick, easy replacement should servicing become necessary.



Ross Heavy Duty Air Control Valve



A No. 2 B & S Milling Machine equipped with Schultes 4 Speed Drive.

4 SPEEDS FOR ANY JOB

on Milling Machines, Shapers, Lathes, Drill Presses, Planers, Punch Presses, Slotters, etc.

The SCHULTES 4-Speed Drive operates each tool at the best speed for the job . . . with finger-tip control.

Schultes-equipped machines are independent units that can be located at the most advantageous points on production lines.

All moving parts enclosed . . . no belts to change by hand . . . fast . . . flexible . . . economical.

Write for further details.

WESTLOF TOOL & DIE CO. 430 Bellevue Ave. Detroit, Michigan



SAROSTON
Precision
Tool Room Grinder

Grinding wheels may be used on either end of spindle.

SIZES UP TO 2 H.P.

THE SAROSTON CO.
251 PARK ST., UPPER MONTCLAIR, N.J.

STEVENS ROTARY TABLES
STANDARD AND DIAL TYPES

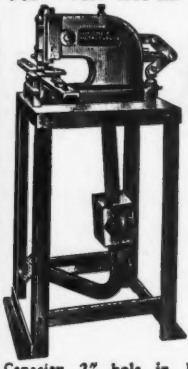


Table graduated for single degree reading. Precision and accuracy. Thirty years' experience designing circular attachments.

Write for circular.
Four sizes, two types of each.

JOHN B. STEVENS INC.
308 Hudson St. New York, N. Y.

Foot Press No. 28

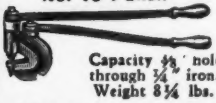


Angle Iron Shear No. 4



Capacity 2"x2"x¼" Angle Iron Weight 44 lbs.

Capacity 2" hole in 16 gauge—100 holes per min. **No. 10 Punch**



Capacity ⅝" hole through ¾" iron. Weight 8¼ lbs.

ASK FOR CATALOG No. 13

•

80 ITEMS FROM WHICH TO CHOOSE

Whitney Metal Tool Co.
110 FORBES ST. ROCKFORD, ILL.

"GUSHER"
COOLANT PUMPS
TANK UNITS



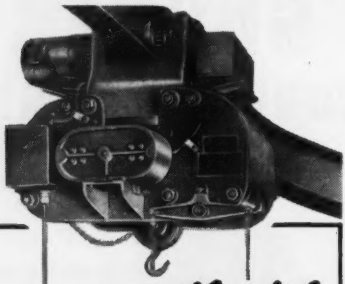
Available now in three standard tank sizes: 4, 11, and 32 gallons.

These units are complete coolant circulating outfits and can be used for machines not originally equipped with pumps or reservoirs, and also as utility pumps in an emergency.

The illustration shows Model UL with ¼ H.P. motor and No. 1 tank.

Write for new specification sheet on tanks.

The Ruthman Machinery Co.
538 E. Front St., Cincinnati, Ohio



Motor Trolleyize

A-E-CO LO-HED Class B Hoists

at a moderate cost

If you already own a Class B, A-E-CO Lo-Hed hoist or are going to buy one, consider the advantages of adding the new low cost Type RB Motor Driven Trolley when:

1. The haul is long or often repeated.
2. The path under hoist is obstructed.
3. Speed is an important factor.

For high-lights of this new motor trolley see A-E-CO POINTS (below). For full details write for the RB folder today.

A-E-CO POINTS

- Separate unit attachable to any Lo-Hed Class B. hoist.
- Short wheel base—turns any curve of 7' radius or over.
- Low headroom.
- Four wheel drive.
- Choice of 2 trolley speeds—100 and 150 F. P. M.
- Trolley balanced by adjustable counter-weights.
- Heavy duty ball bearing hoist service motor.
- Hyatt roller bearings.
- Cast steel trolley wheels with machined rolling surfaces.
- Cast steel housing.
- Alemite fittings . . . Remember—

LO-HED COSTS LESS PER LIFT

AMERICAN ENGINEERING COMPANY

A-E-CO Lo-Hed HOISTS

2451 ARAMINGO AVENUE, PHILADELPHIA, PA.

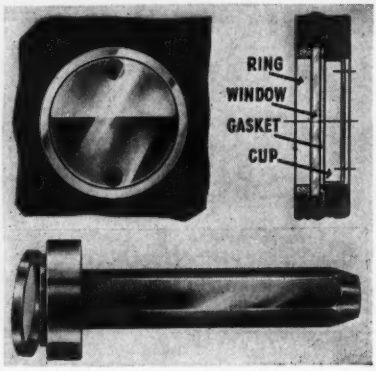
Classified phone directories list the local A-E-CO representatives in principal cities. Call him in, or write us for hoist catalog

OTHER A-E-CO PRODUCTS: TAYLOR STOKERS MARINE DECK AUXILIARIES • HELE-SHAW FLUID POWER

Bijur Sight Oil Window

A sight oil window which affords improved visibility has been introduced by Bijur Lubricating Corporation, Long Island City, N. Y., for general use in connection with oil reservoirs, containers, and lubricators. The unit is self-contained and can conveniently be installed in a simple bored opening readily provided in the design of the machine casting or part.

The Bijur Oil Window assembly consists of a ring (chromium plated with polished face pressed flush), window, gasket, and cup, all fitted snugly into a metal pocket. A drilled opening at the top of the cup and one at the bottom permit free passage of the oil. The bright aluminum background of the cup acts as a reflector which gives sharp visibility of the oil level, even with imperfect lighting. Standard sizes of the window, specified according to the diameter of the aluminum reflector face, are $\frac{3}{4}$, $1\frac{1}{8}$, and $1\frac{5}{16}$ inches.



Bijur Sight Oil Window

A special assembly tool is also available for tapping the ring accurately and securely into place without risk of breaking or marring the window.

"Baby Blue" Desk Unit

A blueprint machine to be known as the "Baby Blue" Desk Unit has been announced by Vandenwood Company, 2900 Euclid Ave., Cleveland, Ohio. The unit prints black and white prints, as well as blueprints. Printing capacity is 10 x 18 in. The source of light is a tubu-



DRILL and PILOT BUSHINGS

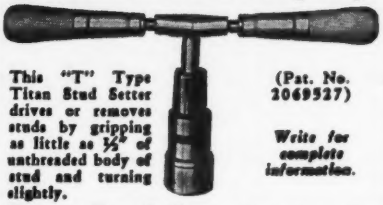
Frictionless —Rotary

For core drilling, T. C. and high speed boring, turret tool piloting, etc. Won't stick or clog. Dust proof as a watch. *Write for details.*

GIERN & ANHOLTT TOOL CO.

1312 Mt. Elliott Ave. Detroit, Mich.

SET STUDS "The Roll Grip Way"



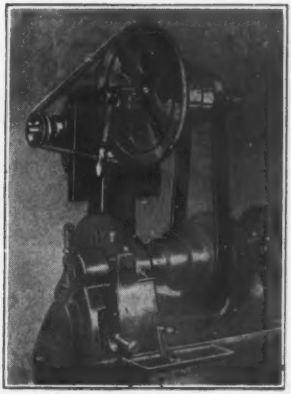
This "T" Type Titan Stud Setter drives or removes studs by gripping as little as ½" of unthreaded body of stud and turning slightly.

(Pat. No. 2069527)

Write for complete information.

Titan Tool Co., Fairview, Pa.

GUARANTEED FOR 5 YEARS



When you purchase a STEEGE Drive for your lathe shaper, miller, etc., you are protected by our broad 5-yr guarantee.

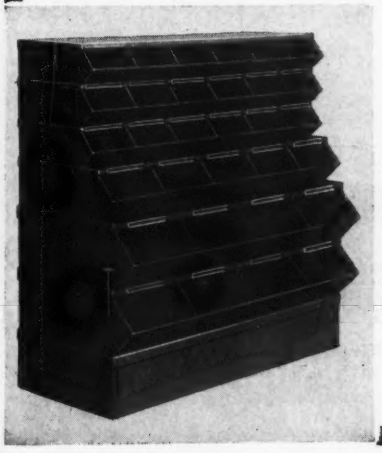
STEEGE Drives are easily installed — prices $35.00 up—sent on 30 days' approval. *Let us send catalog.*

W. L. STEEGE MACHINERY CO.

(Our 23rd Year)

550 W. MONROE ST., CHICAGO, ILL.

A CONVENIENT STOCKROOM --WHEREVER YOU NEED IT!



When the work demands handy parts or materials, set up a STACKBIN stockroom AT THE JOB — and have everything you need within arm's reach. STACKBIN sections nest together as easily as a sectional bookcase — quickly form storage units of any size or capacity—keep parts and materials right where you need them.

Write Stackbin Corp., 53 Troy St., Providence, R. I. for full details and prices—see how easily you can improve handling with patented STACKBIN sections.

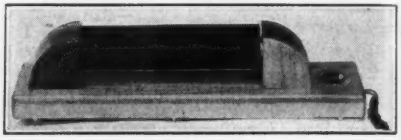
STACKBINS

"STACKED AND STILL ACCESSIBLE"

lar lamp which ensures even distribution of light. The lamp is guaranteed for fifteen hundred hours and will produce many thousands of prints before replacement is needed.

The "Baby Blue" Desk Unit is so called because it is only 34 in. long, 8 in. wide, and weighs 15 lbs. It is finished in natural polished gum wood. The unit is equipped with a time switch so that the operator can perform other tasks while the print is being exposed. The unit is said to be economical in operation, the lamp requiring only 20 watts. The lamp remains cool at all times.

As well as being used for general purpose blueprinting, the Baby Blue Desk Unit can be used for patent drawings,



"Baby Blue" Desk Unit

duplicating typewritten matter, and so on. The unit is easily portable and may be plugged into any lighting circuit.

"Protect-O-Metal"

Protect-O-Metal Compound manufactured by G. W. Smith & Sons, 2016 E. Third St., Dayton, Ohio, comes as a new and valuable aid in the welding and die casting industries. It is said to save money, time, and energy by checkmating the destructive elements of friction, corrosion, and adhesion, ever present high-heat processes.

To use, Protect-O-Metal is brushed onto the surface to be welded. After welding, wipe the surface with a cloth or wash with water and all spatter and surface oxides are removed. Besides this, Protect-O-Metal forms an ideal priming coat for a paint finish if desired. It prevents formation of rust on steel after welding and will not harm the surface of any metal. It does not produce carbon that might affect the weld or the material being welded.

According to the official report of the Bowser-Morner Testing Laboratories, the use of Protect-O-Metal increases the tensile strength of the weld.



NEW INTEGRAL DRIVE PRECISION BENCH LATHE

(Patented)

First tool of its class with built-in motor and speed-changing mechanism, entirely eliminating mill-wrighting. Nothing under bench — Nothing overhead. Drive integral with the lathe itself. Marvelous compactness, using little more space than other lathes. Any powerful vibrationless speed at a turn of the hand wheel in front. Belted and wired, ready to run. Priced at only slightly more than other precision lathes with separate, complicated drives. Two splendid sizes. (Colored Bulletin J).

Also Stark Standard Precision Lathes, 6 sizes, ¼" to 1¼" capacity and up to 12" swing; with complete equipment. Stark Spiral Bench Millers, the most accurate of their type.

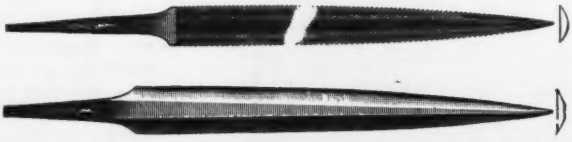
Stark Tool Co. Est. 1862 Waltham, Mass.

Originators of the American Bench Lathe

ALLIGATOR FILES



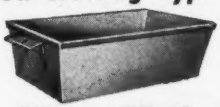
TRADE MARK



Over 4,000 Shapes, Cuts and Sizes
American and Swiss Patterns

CARSON-NEWTON CO.
61-71 MILL ST. • BELLVILLE, N. J.

New Nesting Type Tote Pans



Lots of 50
$1.00 each

20" long x 12" wide x 6½" deep.
16 ga., drag holes and handles both ends.

Lots of 100 & 200 less 3%; 300 up less 5%

J. L. LUCAS & SON, INC.
1 Fox Street Bridgeport, Conn.

CENTERLESS GRINDING

Accuracy—Prompt Service

Commercial Centerless Grinding Co.

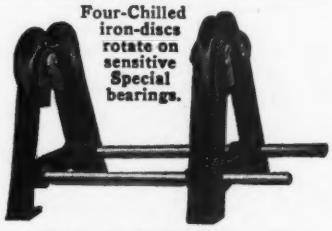
6538 Carnegie Ave., Cleveland

Improved Anderson
Balancing Ways
No Leveling Required

A simple and excellent device for balancing, straightening and trueing.

They are made in the following sizes:

Swing	Greatest Distance Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000

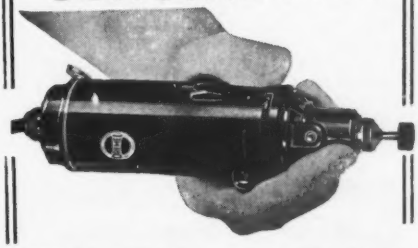


Four-Chilled iron-discs rotate on sensitive Special bearings.

Write for Full Information

Made by **Anderson Bros. Mfg. Co.**
1926 Kishwaukee St. Rockford, Ill.

INSIST on the GENUINE . . . .



MOTO-TOOL

No other motor-in-hand tool of its size and weight has such reserve power and speed, such ease of handling as Moto-Tool. Its compactness enables you to get into places you can't reach with ordinary tools; its 13 oz. weight and vibrationless finger-tip balance allow precision work without the delay of removing and resetting larger tools. It does in minutes what ordinarily requires hours; it pays for itself over and over, week after week, month after month. And it *stands up* under severe service. It has oil-less (oil-sealed) bearings, over-sized hardened shaft and built-in cooling fan; motor armature dynamically balanced to eliminate vibration. Moto-Tool handles over 200 accessories; operates on 110 volt A.C.-D.C. Sold by better dealers, or order direct. Catalog FREE.

Extra Speed (27,000 r.p.m.) and **Extra Power** for all variations of work from hairline precision work to power jobs.

MASTER MODEL
ONLY $16.50 Postpaid

KIT With 23 Accessories
$23.50

DREMEL MFG. CO.
RACINE. WIS.
Dept. 220-A

100 TOOLS IN ONE

GRINDS - CUTS - ROUTS - SAWS
POLISHES - SHARPENS - SANDS

Cesco Reinforced Welding Helmet

A light-proof seamless welding helmet having reinforced side ribs and designated as No. 406 has been announced by The Chicago Eye Shield Company, 2300 Warren Blvd., Chicago, Illinois.

Made in one piece from vulcanized fibre, and without rivets, the welding helmet has been designed with two reinforcing ribs on each side. The ribs, molded in the fibre, strengthen the helmet, add to its rigidity, and prevent warping. Another feature listed for the helmet is a newly designed lens holder, so made that the entire lens-holding unit may be removed by loosening two screws. The cover glass or welding lens can be quickly removed or replaced without the use of tools. The head gear can be adjusted to required size and once adjusted, will remain in position. Wearing comfort is assured.

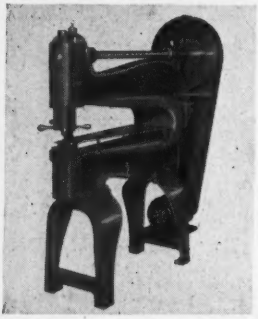


Cesco Reinforced Welding Helmet

Metalprep

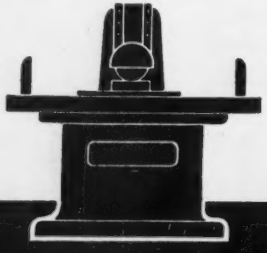
"Metalprep," as its name implies, is intended for use in removing rust, cleaning the metal, destroying rusting agents, and otherwise preparing metal surfaces for paint. Metalprep is a product of Neilson Chemical Co., 6564 Benson St., Detroit, Mich., and was developed to insure a perfect bond between the metal and the prime coating. Paint can be applied within a few hours after rust has been removed and the oxydizing process halted by the use of Metalprep. Bulletin No. 55, "Metalprep and General Maintenance Problems," will be sent upon request.

SAVAGE NIBBLING MACHINES
Powerful Direct-Over-Center Drive
Totally Enclosed Revolving Head



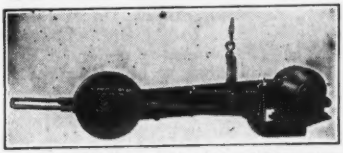
Aircraft plants use Savage Nibblers for template cutting, tube slotting, cutting panels, baffles, flanges, etc.

W. J. SAVAGE COMPANY
KNOXVILLE Since 1885 TENNESSEE
Pioneer Manufacturers of Nibbling Machines



ABRASIVE
Surface Grinders
QUALITY · ACCURACY · DURABILITY · ECONOMY
WRITE FOR PARTICULARS
ABRASIVE MACHINE TOOL CO.
EAST PROVIDENCE, R. I.

MUMMERT-DIXON SWING FRAME GRINDERS

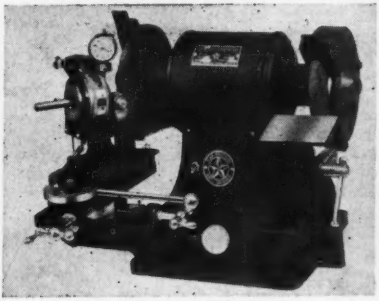


Sizes 12", 14", 16", 18", 20" and 24" wheels.
ASK FOR DESCRIPTIVE CIRCULAR
MUMMERT-DIXON CO.
120 Philadelphia St. • Hanover, Pa.



30 YEARS EXPERIENCE
DETROIT BEVEL GEAR CO.
8130 Joseph Campau Ave., Detroit, Michigan

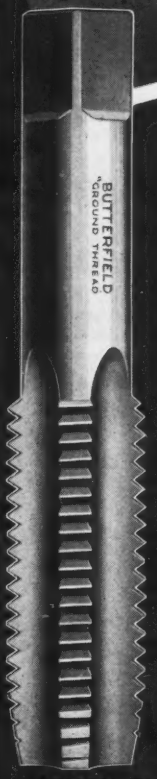
Trim Your Drill Costs
with a
STAR PRECISION DRILL GRINDER



Produces perfect points on drills No. 41 to 5/8" inc. *Write for Descriptive Folder.*

Star Machine & Engineering Corp.
Division Star Electric Motor Co., Bloomfield, N. J.

BUTTERFIELD *taps*



● Compare Butterfield Taps with other taps for long life and cost per accurately threaded hole. The difference will reveal the superiority of Butterfield Taps and their profit possibilities.

COMPARE
BUY
PROFIT

UNION TWIST DRILL CO.
BUTTERFIELD DIVISION
Factories: DERBYLINE, VERMONT, U.S.A.
Athol, Mass.; Mansfield, Mass.;
Rock Island, Quebec, Can.

STORES:
Cleveland . . 3346 Superior Ave.
Chicago . . 11 S. Clinton St.
Detroit . . 6540 Antoine St.
New York . . 61 Reade St.

A GERSTNER Tool Chest



Is essential for best results from good tools. It protects tools from loss, damage, "borrowing," and makes work easier. Machinists and Toolmakers will be proud to own and to use a genuine *Gerstner* Chest. Free Catalog.

GERSTNER TOOL CHESTS

1240 COLUMBIA ST. DAYTON, OHIO

GEARS

Good Gears Only

All Kinds

Any Quantity

AT THE RIGHT PRICE

THE CINCINNATI GEAR CO.

1825 Reading Road Cincinnati, Ohio

Special Anti-Mushrooming

Anti-Chipping Heat-treat

Oversize Shanks ▶

Exclusive Knurled Back ▶

Exclusive Thumb Grip ▶

Broach-Rounded ▶ Corners



and a complete line of Marking Devices

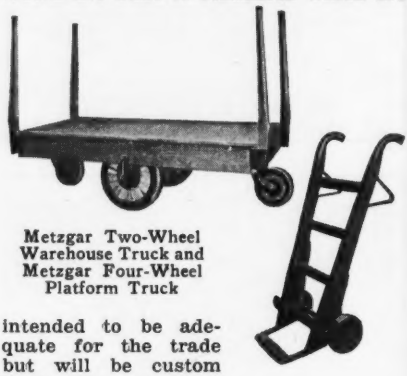
Write for Price and data Bulletin No. 113-12.

NEW METHOD STEEL STAMPS, Inc.

149 Joseph Campau, Detroit

Metzgar Trucks

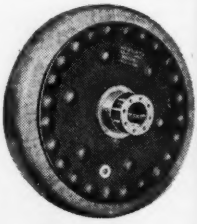
To the line of The Metzgar Company 112 Logan St., S. W., Grand Rapids, Mich., has been added the two-wheel warehouse truck and four-wheel platform truck illustrated herewith. The trucks are built to standards which are



Metzgar Two-Wheel Warehouse Truck and Metzgar Four-Wheel Platform Truck

intended to be adequate for the trade but will be custom built when required to fit customers' specifications.

The trucks are designed for hard use and long wear. Platform trucks are constructed on a welded chassis thus eliminating possibility of any loosening of the joints. The two-wheel warehouse trucks are similarly constructed. The trucks are, of course, equipped with end wood wheels which may be fitted with either oilless end wood bearings, ball bearing, or Hyatt roller bearings, and in each case they are guaranteed against breakage and for life against any imperfections in workmanship or material.



Metzgar End Wood Truck Wheel

Ault & Wiborg Low-Bake Metal Finish

An industrial finish with exceptionally low temperature speed-baking characteristics, intended for application in finishing practically all kinds of metal products, is announced by Ault & Wi-

AUTOM

CONTINUOUS HINGES



Manufactured by

AUTO MOULDING & MFG. CO.

2326 S. CANAL ST. CHICAGO

WRITE FOR STOCK LIST

☆STAR MOLY☆

TRADE MARK

DOLLAR FOR DOLLAR,
STAR BLADES CUT MORE METAL

Also Star Frames made in four types —strong, durably finished, well balanced — especially suitable for Star Blades.

HAND AND POWER—TUNGSTEN AND "MOLY"
PACKED IN MODERN METAL BOXES

STAR HACK SAW BLADES

CLEMSON BROS., INC., MIDDLETOWN, N.Y.

174

Here's the point for lowering your machinery maintenance costs and for preventing breakdowns - specify -



Fig. 1645
Pats. Pend.

UNBRAKO

SELF-LOCKING HOLLOW SET SCREWS

These screws lock automatically with a grip that just can't shake loose under severest vibration. And that can put an end to your troubles caused by ordinary set screws working free . . . no more continual tightening up or worrying about breakdowns.
However, these screws are easy to apply and remove with the usual hex bar wrench and can be used over and over again.

STANDARD PRESSED STEEL CO.

BRANCHES BOSTON DETROIT INDIANAPOLIS

JENKINTOWN, PENNA.
Box 556

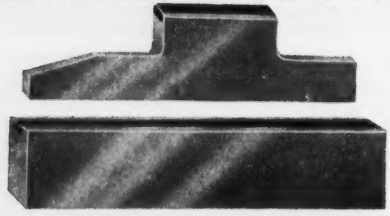
BRANCHES CHICAGO ST. LOUIS SAN FRANCISCO

borg Corporation, Dept. PFJ, 75 Varick St., New York, N. Y.

The finish is to be known as Polymerin-100 and is an improvement upon the original Polymerin, a speed-bake finish previously introduced by this firm which requires relatively high baking temperatures. The Polymerin-100 formulation makes possible curing temperatures often as much as 100 deg. below those of Polymerin, thus extending this type of speed finish to the low-bake field.

Polymerin-100 is said to have remarkable qualities of resistance and durability and the manufacturers state that it has excellent film hardness, lustre, build, adhesion, toughness, opacity, and color retention. It is also said to resist the common deteriorants.

The exact baking temperatures required for Polymerin-100 depend upon the type and size of the oven, the mass of metal involved, and other factors, but it is claimed that the curing temperatures are the lowest ever obtained for a speed-baking finish with equal properties of adhesion, flexibility, color retention, and toughness. The low-bake finish may be used in conventional ovens which makes it available for use where speed-bake finishes are impractical due to the high temperatures involved. Manufacturers with force-dry equipment can use Polymerin-100 successfully by stepping up their oven heats slightly.

LENGTHEN LIFE OF...
CENTERLESS GRINDER BLADES

• 10-30 Times Longer Life
• Reduce Replacement Costs
• Do Not Mark or Score Work
• Improve Accuracy and Efficiency
WHEN Talide Tipped WITH
TUNGSTEN CARBIDE WEAR STRIPS
Made in Any Length, Shape or Size
METAL CARBIDES CORPORATION
YOUNGSTOWN, OHIO

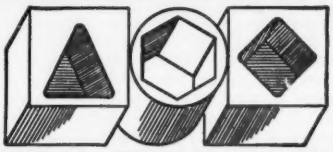
Empire Four-Cylinder Portable Spray Outfit

A four-cylinder portable spray outfit, to be known as the "Empire Pressure King" has been placed on the market by Empire Compressor Manufacturing Co., Inc., 13 E. Benson St. and Pennsylvania R. R., Reading, Ohio. The outfit is said to deliver an even flow of air without pulsations.

A high and steady pressure is obtainable with the compressor. It uses four steel pistons with step-cut rings. The bore is 1⅜ in. and the stroke is 1⅝ in. The unit is powered with a ½ h.p. motor which enables the compressor to deliver 4 cu. ft. of air per minute at 60 lbs. pressure. The pressure is adjustable from 0 to 80 pounds.

A safety valve provided with the unit can be set for any desired load. The unit is cooled by a fan blade type of flywheel and extra deep fins in the block and head. Air cleaning chambers pro-

"OUTWEARS the best Bronze Metal"
20 years ARGUTO KA without a drink—
ARGUTO OILLESS BEARING CO
Wayne Junction, Philadelphia, Pa.



DRILL THESE HOLES

By a Quick, Easy, Inexpensive Method

Your business letterhead will bring literature.

WATTS BROS. TOOL WORKS

WILMERDING, PA.

YOU'LL SAVE TIME

AND TROUBLE . . . BY SPECIFYING NATIONAL TWIST DRILLS, HOBS, REAMERS . . . MILLING CUTTERS, *Special* TOOLS



NATIONAL TWIST DRILL AND TOOL CO.

DETROIT, U. S. A.

Tap and Die Division, WINTER BROS. CO., Wrentham, Mass.

Factory Branches: New York, Chicago, Philadelphia, Cleveland

Distributors in Principal Cities

Jan 1, 1940

NO INCREASE IN PRICE

of

CARBOLOY

DIAMOND DRESSERS

For Dressing All Grinding Wheels

Write for Catalog DR-38

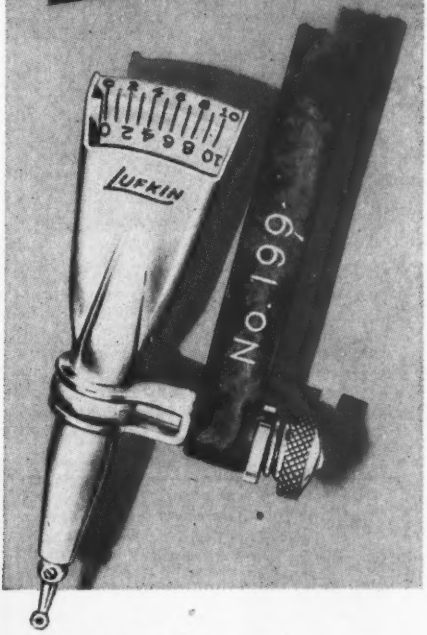
CARBOLOY COMPANY, INC.

11143 E. 8 Mile Road, Detroit, Mich.

Chic.- Cleve.- Newark- Phila.- Pitts.- Worcester, Mass.

LUFKIN

UNIVERSAL INDICATOR



This is the Indicator that's so easy to set — and that stays set with positive lock. It has TWO reading faces: on the flat surface and at the end so readings can be taken without the aid of a mirror.

See its many uses illustrated in Catalog 12A.

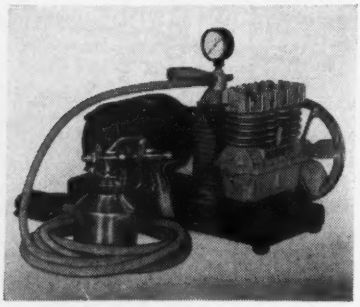
BUY THROUGH YOUR DISTRIBUTOR

LUFKIN

SAGINAW, MICHIGAN • New York City

TAPES · RULES · PRECISION TOOLS

vide a means for filtering the air and removing water, oil, and other impurities. The valves of the unit are stainless steel and are easily removable. The



Empire Four-Cylinder Portable Spray Outfit

air intakes are protected with special filters to prevent intake of mist which would make cleaning of the valves necessary after each job.

A complete special combination outfit consisting of the Pressure King Four-Cylinder Compressor, a ⅓ h.p. 110 volt A.C. 60 cycle motor, a pressure spray gun of the bleeder type with two tips for fine and coarse materials, and two nozzles for fan spray, is available.

The compressor can also be driven with a ½ h.p. Briggs and Stratton gasoline engine when electric power is not available. Any small type of gasoline engine will suffice.

Sterling Gyro Electric Sander

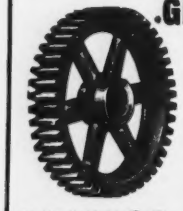
Sterling Products Company, 2473 Woodward Ave., Detroit, Mich., has brought out an air driven portable electric sander designated as the Sterling Gyro Electric Sander, illustrated herewith. The sander is powered by a self-contained gear driven electric motor which can be plugged into any socket. The flexible sanding pad operates with a reciprocating movement which closely simulates the hand sanding motion of the skilled craftsman. Operating at 4,000 r.p.m., it is reported to do a sanding job



Sterling Gyro Electric Sander

in a fraction of the time required for hand work.

The abrasive paper used, consisting of one-quarter of a standard size 9 x 11-in. sheet, is easily attached to the sanding pad and is held in place by a special holder. Any type or make of abrasive paper may be used. The tool can also be used for rubbing or polishing, in


GEARS IN STOCK
Immediate Delivery
Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on special gears of any kind. Send us your blue prints and inquiries.
Write for Cat. No. 80
CHICAGO GEAR WORKS
440-48 N. Oakley Blvd., Chicago, Ill.

THE PURE OIL CO.
CHICAGO, U. S. A.
PURE THREE POINT LUBRICATION
A Complete Line of Industrial Petroleum Products
PURE
A Pure Oil engineer will help solve your lubrication problems. Write today.

QUICK and ACCURATE

No. 35 FLYNN



MICROMETER OFFSET BORING HEAD HAS RIGIDITY *PLUS* A Large Range 2" OFFSET

¾" bar or tool capacity. Bores ½" to 12" dia. holes. *Write for catalog.*

FLYNN MANUFACTURING CO.

437 Bates St. • Detroit, Mich.

DANLY DIE SETS

Precision Commercial Special



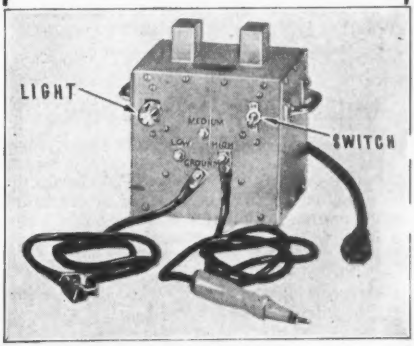
Danly Machine Specialties Inc.

2130 S. 52 Avenue, Chicago

DANLY DIE MAKERS' SUPPLIES

RED-D POWER Improved

Combination Demagnetizer & Etcher



Made of two separate coils. Demagnetizing poles are higher and closer together to demagnetize small pieces by drawing them through pole pieces. Red light shows that unit is in operation.

SOLD ON 10 DAYS TRIAL.

Some territories open for representatives.

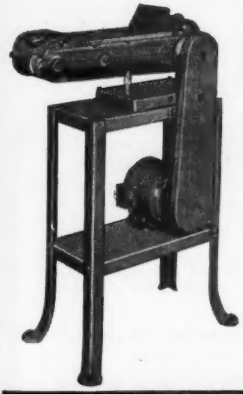
Grinding Machinery Co.

2832 E. Grand Blvd. • Detroit, Mich.

New

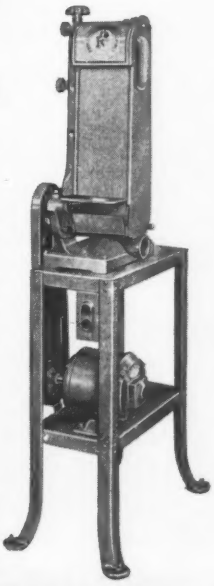
ABRASIVE BELT SURFACER No. 608

Adjustable from horizontal to vertical position in a few seconds.



Here's a new, handy, compact, polishing machine with a large capacity for production work. The work or belt table is 15" long x 6" wide with a surface speed of 2300 ft. per minute. Exhaust connection provided and vacuum cleaner bag may be attached —no dust—no dirt. Write for folder.

Other Sizes and Types.



PRODUCTION MACHINE COMPANY

GREENFIELD • MASSACHUSETTS

which case polishing cloths are attached in the same manner. The manufacturer states that the unique motion of the sanding pad eliminates chasing or graining effects. The sander is sturdily constructed yet light in weight, weighing 3½ pounds.

Industrial Welder's Glove No. 13115

The Industrial Gloves Co., 720 Garfield Blvd., Danville, Ill., has added a chrome tanned leather welder's glove to its line of safety clothing. The glove, designated as No. 13115, is made with a one-piece back which extends from the knuckles to the top edge of the glove, thus eliminating all seams on the back of the hand. Such a construction provides extra leather to protect the welder's knuckles, in addition to the heavy cotton fleece which lines the entire back of the glove from the knuckles to the top edge.



Industrial Welder's Glove No. 13115

The thumb seam is protected with an extra leather strap, while the seam attaching the hand to the cuff is reinforced by a leather apron which extends the full width of the glove. The absence of lining in the palm assures the welder of proper "touch" at all times.

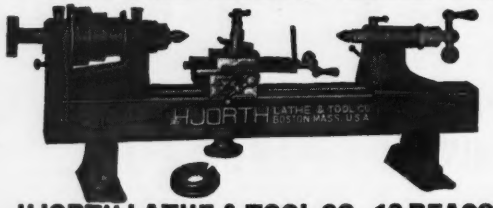
The leather used in the manufacture of the Industrial Welder's Glove No. 13115 is of special chrome tannage which is said to resist shrinkage and hardening to a maximum degree, and to keep the glove soft and flexible under severe temperatures. The glove is cut on an extra full pattern so that the welder is assured of cool, comfortable protection at all times.

Havens Protected "C" Clamp

The Havens Protected "C" Clamp described here is now being marketed by Scully Steel Products Co., 1319 Wabansia Ave., Chicago, Ill., in three different types. The "C" castings are made of special "certified" casting metal having high tensile strength and are built to stand abuse. A strong compression sleeve protects the threads on the screw from damage, and a long guide is employed to keep the sleeve in alignment. The section of the screw above the top of the clamp is always in tension, thus preventing bending of the screw. The screw never takes stress below the top of the clamp and it cannot buckle or bend. A phosphor bronze bearing ensures easy turning.

The "S" Series (Shallow Throat) Clamp is available in six sizes, having a throat range of from 2¼ to 3½ in. and a gap range of from 3 to 12¼ in. The working clamping pressure varies from 3,000 to 9,000 lbs. The "MS" Series (Medium Throat) can be supplied in five sizes. The throat range is from 3 to 3⅞ in. and the gap range is from 4¼ to 12¼ in. Working clamping pres-

. . . for more than 1001 odd jobs



The Hjorth Bench Lathe has the speed, accuracy, handling ease, and dependability that appeals to every operator. That's why you'll find the better shops equipping with the Hjorth Lathe.

Write today for data and prices.

HJORTH LATHE & TOOL CO., 12 BEACON ST., WOBURN, MASS.

GRINDING WHEEL DRESSERS

We make all types of Dressers and Cutters



Write for Catalog "M"

DESMOND-STEPHAN MFG. CO.
URBANA, OHIO
The Canadian Desmond-Stephan Mfg. Co., Ltd.
Hamilton, Ontario, Canada

T. H. LEWTHWAITE MACHINE CO.

PUNCHES CUTTERS
BENDERS
SPECIAL TOOLS

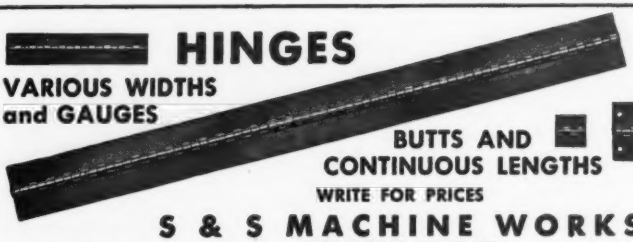
PUNCHES and DIES for round, square and other shaped holes. Catalog sent on request.



317 EAST 47TH ST. • NEW YORK CITY
Wickersham 2-7164

HINGES

VARIOUS WIDTHS and GAUGES



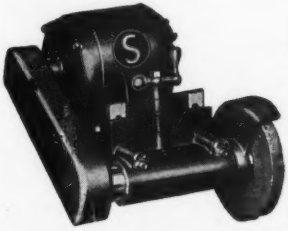
BUTTS AND CONTINUOUS LENGTHS

For GUARDS CABINETS CASES BOXES

WRITE FOR PRICES

S & S MACHINE WORKS
4541 W. LAKE STREET HARDWARE DIVISION CHICAGO, ILLINOIS

PRECISION! VERSATILE!



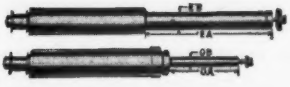
The STANDARD Type BPA Precision Internal-External Grinder is a 2-in-1 Tool. You can grind Externally and in a few minutes mount an Interchangeable Spindle Unit for Internal grinding.

The machine is versatile as it can be used with a wide range of Internal Spindle Units or for External grinding and applied to Lathe, Planer, Boring Mill, etc.

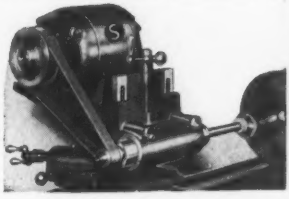
Features: Correct speed on grinding wheels. Maximum wheel wear. Minimum interference with work as the wheel overhangs the front of machine.

Sizes: ¼, ½, 1, 1½, 2, 3, 5, 7½ and 10 H.P.

Interchangeable Spindle Units to grind Internally up to 24" deep.



Write for Bulletin 162



The STANDARD Line includes:

Heavy Duty Grinders, 6" to 30" wheels; Disc and Ring Wheel Grinders; Portable Grinders; Buffing and Polishing Machines up to 25 H.P. Portable Electric Drills and Blowers.

Complete Catalog on Request.

THE STANDARD ELECTRICAL TOOL CO.

EIGHTH AND EVANS STREETS Est. 1912 CINCINNATI, OHIO

sures vary from 3,000 to 6,000 lbs. The "L" Series (Deep Throat) is also available in six sizes, with throat capacities of from 2½ to 5 in., and gap capacities of from 3 to 12¼ in. Working clamping pressures range from 2,000 to 4,000 lbs.

Model D-520 Wrigraph Drafter

L. C. Wright Incorporated, 5209 Euclid Ave., Cleveland, Ohio, announces the addition of the Model D-520 Wrigraph Portable Drafting Machine to its line of precision instruments.

The Model D-520 Wrigraph Drafter is equipped with an exclusive type of Wrigraph Adjustable Ball Bearing, which is said to increase the accurate life of the machine five times over previous models. The Model D-520 will make drawings 20 x 26 in. or smaller. It is attractively finished in black wrinkle enamel and heavy nickel plating.

The machine is furnished with a special "tack on" mounting plate so that it can be instantly fastened to any flat wooden surface and in any position. The protractor is of the one degree indicating type and a new kind of transparent edge, engine-divided scale is used. Scales are interchangeable on the protractor head and all standard graduations are available. The entire machine can be knocked down and carried in a brief case.

Lincoln "Fleetweld 10"

An arc welding electrode which will facilitate finishing operations on welded products by eliminating the need of dressing or smoothing welded seams in many applications has been announced by The Lincoln Electric Company, Cleveland, Ohio.

The electrode, known as "Fleetweld 10," is designed particularly for finish bead welding on "U" groove welding in downhand position. The electrode provides full slag coverage and a weld deposit of exceptional smoothness. The bead is uniform and regular without square shoulders. The metal smooths out evenly during welding and the line of fusion with the base metal is said to be practically unnoticeable. Finish beads can be made in V-butt joints in flat position which are flush with the surface of the plates. The surface of the bead made with the electrode has very little "rippled" effect.

The ability of "Fleetweld 10" to produce smooth welds for last-pass beads will be found advantageous in all applications where appearance is important. By employing the electrode for the final bead on joints where smooth finish is required, many manufacturers will be able to save the time and labor formerly required to "dress" the welds. In other cases, where the nature of the product requires grinding, buffing, and polishing to assure the maximum in appearance, the finishing work will be greatly simplified as far as the welded seams are concerned.

"Fleetweld 10" can be used with either normal or reverse polarity with direct current, or with alternating current. It is made in two sizes in 18-in. lengths —¼ and 5/32-in.—and is packed in 50-lb. containers as standard packages.

Moore Jig Grinder

In the announcement of the Moore Jig Grinder which was published on page 164 of the December, 1939, issue of this magazine the description read as follows: "The dial is graduated with 100 lines spaced about ⅛ in. apart, each graduation representing 0.001 in. movement of the cross slide." This should have read 0.0001 inch.



LOWER LAPPING COSTS

COPPERHEAD LAPS cost less than making your own to suit individual jobs. They last indefinitely because of patented Replaceable COPPER SLEEVES.

Complete stocks of all sizes from ⅛" to 2½" available for quick shipment.

WRITE FOR BULLETIN

BOYAR-SCHULTZ CORPORATION

2120 WALNUT STREET
CHICAGO • ILLINOIS

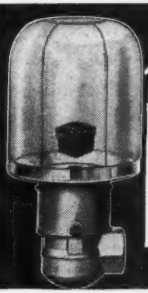
NEW UNIVERSAL INDICATOR
SHOCKPROOF



Scale readable in any position. Entire mechanism shockproof. Has had 12 years of actual shop test. Ideal for jig boring, milling, etc.

Write for prices, details.

OSLUND TOOL & DIE COMPANY
14 Sigourney St., Hartford, Connecticut



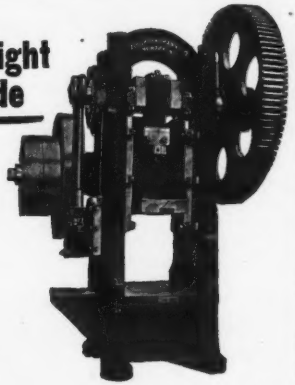
NEW *Unbreakable* OILERS

TRICO OILERS maintain a constant level of oil in bearings. No guesswork, bearing failures, waste of oil or grease, oil-soaked motor windings, fire and accident hazards. A wonderful investment.

Write for Bulletin #25

TRICO FUSE MFG. CO.
Milwaukee . Wisconsin

Straight Side



Outstanding in every detail for heavy blanking and forming work. All stresses are taken centrally.

Write for new catalog illustrating and describing this and other presses.

Zeh & Hahnemann Co.
184 Vanderpool St. Newark, N. J.

BETTER GRIP PERFECT FIT LASTING HOLD with KNURLED

UNBRAKO

SOCKET SCREWS



Knurled heads . . . found on "Unbrako" Products . . . provide a non-slip gripping surface for the mechanic's fingers or pliers. This means time saved on production jobs—and time saved is money in your pockets.

Fig. 1434 Knurled "UNBRAKO" Socket Head Cap Screw with the "Better Gripping Head" Pat's. Pend.

Fig. 1446 Knurled "UNBRAKO" Socket Head Stripper Bolt with the "Better Gripping Head"



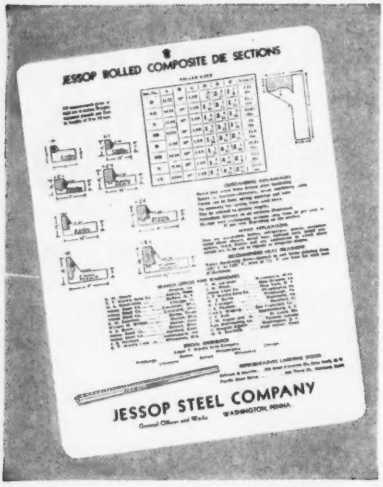
Strong, tough alloys precisely machined insure a uniformly perfect fit and a lasting hold for each "Unbrako" Socket Screw. Write us and we'll be glad to send samples and full information.

STANDARD PRESSED STEEL CO.
JENKINTOWN, PENNA.

Boston
Detroit
Indianapolis
Box 556
Chicago
St. Louis
San Francisco

Wall Chart of Jessop Rolled Composite Die Sections

Jessop Steel Co., 574 Green St., Washington, Pa., has just issued a new wall chart which gives the specifications for their rolled composite die sections, used



in dies for cutting sheet metal to regular or irregular shapes.

End views of eight different die sections are illustrated, and the rolled sizes are listed in a readable table. Also included in the table are the weights per foot in lengths of eight to ten feet, varying from 7.25 lbs. for Section D to 23.94 lbs. for Section CC.

Among the advantages of Jessop rolled composite die sections, as set forth in the new chart, are ease of machining and forming and the possibility of drilling dowel and screw holes after hardening. Savings over rectangular sections vary from 28 per cent to 47 per cent, depending on the section. Typical applications of sectional dies, ranging from railroad cars to metal toys, are given, as well as the recommended heat treatment for Jessop die sections.

The new chart has been printed on heavy, varnished cardboard stock to withstand rough handling, and has a hole punched at the top so that it may be easily hung from the wall. It is available to readers without cost.

Johnson "Size Finder" for General Purpose Bearings

A window slide finder for finding the stock size and part number of any one of the more than 800 stock sizes of Johnson General Purpose Bearings is now being distributed by Johnson Bronze Company, 906 South Mill St., New Castle, Pa. To find a stock size, the user selects the group covering the range within which the size wanted falls, then moves the slide until the correct combination of inside diameter, outside diameter, and length appears. This will also show the part number.

The finder is free to any mechanical executive who requests it on his company letterhead.

New Books

Manual on Cutting of Metals. Prepared by A.S.M.E. Committee on Metal Cutting Data. Published by The American Society of Mechanical Engineers, 29 West 39th St., New York, N. Y. 319 pages, 36 illustrations, 339 tables. Fab-

Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS



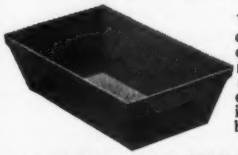
Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S. Inexpensive — Last for years.

Write for Circular

NIELSEN TOOL & DIE COMPANY
1863 Gardner Ave.
Berkley, Mich.



We Fill Your Steel
Shop Equipment Needs



Write to us for complete catalog on barrels, kegs, pails, racks, shelving, etc. We design for service and durability.

The CLEVELAND WIRE SPRING Co.
CLEVELAND • OHIO

IDEAL DOUBLE SCALE INDICATOR
COMPLETE WITH HOLDER, $4.00



AGENTS WANTED
Send for Descriptive folder.
Reading from Front or Rear

IDEAL TOOL COMPANY
335 Sagamore Drive Rochester, N. Y.



MORE with THOR

THOR STAMPS give you more marks per dollar. They're made of correctly-heated alloy steel. Central striking point gives uniform indentation. Thumb side marking makes them easily read—easily used. Write for catalog.

The Pittsburgh Stamp Co. 812 CANAL ST. PITTSBURGH, PA.



"ROTABIN"

Saves time of Men and Machines

Rotating sections bring stock or tools to you mechanically. No time wasted looking for correct size. Helps solve high cost of handling material in plant. Let us survey and submit a carefully planned proposal of "ROTABIN" best suited to your requirements.—NO COST—NO OBLIGATION.

THE FRICK-GALLAGHER MFG. CO., Wellston, Ohio

ricoid binding. Price, $5.

The material presented in this volume is the result of the work done by the Committee on Metal Cutting Data of the A.S.M.E. in the correlation of the data that has been obtained by the many investigators since Fred W. Taylor, to fill in the gaps in their investigations, and to reduce the data to a form that would permit of practical application in the machine shop.

The present effort is limited to a study of single-point cutting tools as used in the lathe or similar machines. All available data has been reviewed and experiments have been made by the committee to close the gaps in such data as well as to test tentative relations developed by the committee from the published data. From these data the important facts connected with the cutting of metals have been determined and are presented in this volume.

The book is written to meet the requirements of the shop, all data having been put into such form that they are immediately useable by the mechanical engineer, production executive, or machine designer.

Magnesium and Its Alloys. By J. L. Haughton, S.Sc., F. Inst. P. and W. E. Prytherch, M.Sc. First American edition. Published by Chemical Publishing Company, Inc., 148 Lafayette St., New York, N. Y. 100 pages; 60 illustrations; 36 tables. Cloth binding. Price, $1.50.

To meet the ever-increasing demand for lightness in construction, a great amount of research has been undertaken in many countries to determine the possibility of using magnesium alloys in place of the heavier aluminum alloys. Reports on the results of this work are scattered through many scientific and engineering journals.

The Metallurgy Research Board of the Department of Scientific and Industrial Research (British), under whose guidance work has been proceeding on this subject at the National Physical Laboratory for a number of years, considered that it would be of use to British industry if their own results and other results already published were collected in a single volume.

This has now been done, and with the publication of "Magnesium and Its Alloys," industry now has in convenient form much useful information that previously was available only after much searching of the literature of many languages.

The ABC of Aviation. By Lt. Col. Victor W. Page, Air Corps, U.S.R. Member Advisory Board for Aeronautics, State of Conn., Author "Modern Aircraft," "Aviation Engines," etc. Published by The Norman W. Henley Pub. Co., 2 West 45th St., New York, N. Y. 418 pages, 208 illustrations. Cloth covers. Price, $2.50.

Intended to be used as an instruction book on the subject of aviation in schools and colleges, this book is written in simple language with a sufficient number of illustrations to clarify the text. The book comprises, in effect, a simplified exposition of all types of aircraft with condensed instructions on their basic principles of construction and operation, describing important recent developments in airplanes and engines,, airliners, inspection and trouble-shooting prior to flight, and so on.

The illustrations include photographs and drawings of leading types of airplanes and airplane parts. Notes are given on airplane control and flying maneuvers are described. The information is presented in a non-technical

GROBET
Rotary Files
Ground from the Solid



Ask for catalog Kg, the most complete catalog of its kind, illustrating hundreds of rotary files hand cut, milled cut, ground from the solid; also diesinkers' burs.

GROBET FILE CORP. of AMERICA
3 Park Place • New York City

5000 SHAPES AND SIZES GROBET Swiss Files



Write for Catalog KNA.

The most complete catalog of its kind. Lists 5000 different shapes, sizes and cuts of GROBET Precision Swiss Files — also Rotary files, Files for Filing Machines, American style files, etc.

Learn more about these Chrome Steel Files that have won a reputation for utmost precision and durability.

GROBET FILE CORP. OF AMERICA 3 Park Pl., New York, N. Y.



Janette Speed Reducers

43 SIZES FROM 1/50 TO 10 H.P.

Speeds from .0083 to 1140 r.p.m.

The diversity of Janette motorized and motorless reducers enables you to select the style of compact, rugged speed reducer, to exactly meet your individual requirements. *May we give you complete information.*

MOTOR GENERATORS—CONVERTERS—DYNAMOTORS

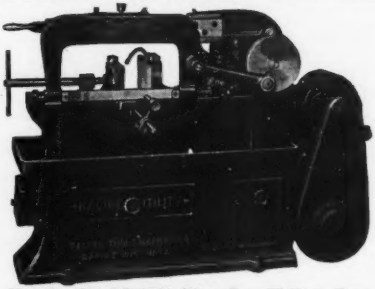
Janette Manufacturing Company

556-558 West Monroe Street

Chicago

RACINE

HIGH SPEED METAL CUTTING MACHINES



W-3B "RACINE" Wet Cut Utility Saw, 6" Capacity.

Most complete line. Metal cutting machines for every size and purpose—Full automatic—Production — General Utility — For small shops and large. Write for prices on the new "RACINE" Utility saws—6" Capacity—Both Wet and Dry Cut types. Also for Production and heavy duty Hydraulic machines. Fastest cutting — Remarkably low prices.

"Standard the World Over"

RACINE TOOL AND MACHINE COMPANY

1770 State Street • **Racine, Wis.**

manner and any necessary technical terms are defined and discussed so that they will be understood.

Forging Practice. By Carl G. Johnson, Assistant Professor of Mechanical Engineering, Worcester Polytechnic Institute. 136 pages, 122 illustrations, and several tables. Water and vermin-proof binding. Published by The American Technical Society, Drexel Ave. at 58th St., Chicago, Ill.

This book deals with hand forging of wrought iron, machine and tool steel, drop forging, and heat treatment of steel, including annealing, hardening and tempering. It shows how to select various workable metals for specific purposes, determine the working temperature of various metals, recognize the characteristics of cast ingot steel, become familiar with the changes that take place in hot and cold working of metals, heat metals for hot workings, use forges and furnaces for the heating and forging of metals, use the various hand forging tools, weld by forging, weld tool steel, carry out the various processes used in tool forging, use power hammer forging tools, use drop forging methods, use upset-forging and cold rolling, perform cold swagging, pressing and drawing, form shapes by the spinning of metals, determine defects in forgings by tests of fracture and cutting, hot acid etch tests, the use of microscopes, physical tests, and non-destructive tests, apply heat treatment to steel forgings, determine temperatures by tempering colors, use a hardness conversion table, and indentify steel.

The book will be found especially useful as a beginning text in the teaching of forging practice, and should be of value to everyone interested in this phase of metal working.

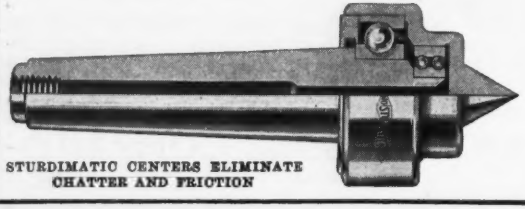
Medicolegal Phases of Occupational Diseases. By C. O. Sappington, M.D., Dr. P.H. Published by Industrial Health Book Company, 540 N. Michigan Ave., Chicago, Ill. 400 pages, 5¾ x 7¾. Bound in cloth or semi-flexible. Price, cloth, $2.75.

Inasmuch as industrial health, industrial hygiene, industrial medicine, and occupational diseases are receiving an increasing amount of attention, this book is particularly opportune. The material of the book has been divided into four parts; Industrial, Insurance, Medical, and Legal, and the relationships of the personnel of each of these divisions are shown throughout the text, indicating the necessity of the business executive, the insurance carrier, the industrial physician, and the lawyer cooperating in the solution of common problems.

Part I covers such subjects as causes of occupational diseases, gases and vapors, volatile solvents, the working environment, control of occupational exposures, and so on. Part II deals with the specific approach necessary for insurance, information needed and methods available, some practical problems, and the importance of prevention. Part III discusses occupational diseases, occupational poisonings, other occupational effects, diagnosis, estimation of disability, treatment, and prevention. Part IV covers compensational experience, occupational disease disability laws, medicolegal evidence, present methods of adjudication, the physician as a witness, other professional witnesses, legal decisions, and present and future trends of occupational disease disability legislation.

The author has presented the material in a clear and concise manner, indicating the coordination of the exten-

IT TURNS WITH THE WORK . . . .



STURDIMATIC CENTERS ELIMINATE CHATTER AND FRICTION

8 years continuous use has proved its value.

Sturdy radial and thrust bearings insure rigidity and load capacity.

Write for catalog and free trial offer:

STURDIMATIC TOOL CO.
5222 THIRD, DETROIT

sive and complicated factors of the field of industrial hygiene and occupational diseases. Each part consists of an introduction, chapter text, and a summary and list of references for that particular part. An excellent appendix is included covering different kinds of records, abstracts of state laws, abstracts of legal decisions, and so on.

A Modern Technical and Engineering Spanish Dictionary. By R. L. Guinle, G.C.E., F.I.L. Published by Chemical Publishing Company, Inc., 148 Lafayette St., New York, N. Y. 336 pages. Bound in cloth. Price, $4.00.

There are some 20 different Spanish-speaking countries in the world, of which 19 are in the Western Hemisphere. Their aggregate population is over 100 millions. To facilitate commerce between these countries and the English-speaking countries, the author of this volume has compiled the first dictionary of its type written by a professional consulting engineer. Mr. Guinle has had more than 20 years' experience as consulting engineer in South American countries, and in compiling

Drive Taps and Reamers
in Turrets of Lathes and
Hand or Automatic
Screw Machines
WITH THE
ZIEGLER
ROLLER DRIVE
Floating Holder



- Floats radially in any position.
- Automatically compensates for machine spindle misalignment, eliminating over-sized or bell-mouthed holes.
- Helps produce unbelievable accuracy on both new and old equipment.

W. M. ZIEGLER TOOL CO.
1926 Twelfth Street Detroit, Michigan

CHICAGO MOUNTED WHEELS OF **V/T SUPER BOND**

Greatest Forward Step in 30 Years
V/T Super Bond is one of the most important developments in mounted wheels. Nothing compares with it in long life, stamina and performance.

150% LONGER LIFE



Chicago Mounted Wheels of V/T Super Bond have 150% to 300% longer life, according to tests in many plants on snagging and exacting operations. Will not ridge on welds, sharp corners, sinking dies, barbering, etc. There's a shape and size to handle every grinding job faster, better, at lower cost. Let us send you a trial wheel. Tell us the kind of job, type of equipment used and size wheel you prefer.

FREE MOUNTED WHEEL CHART — Ideal for ready reference in the shop. A Wall Chart 22 x 15" showing actual size and shape of every standard Chicago Mounted Wheel.

HANDEE Tool of 1001 Uses
A small "power house" that can be used wherever there is an electric outlet. Grinds, drills, polishes, cuts, routs, carves, sands, saws, sharpens, engraves, cleans, etc. Uses 300 accessories. Weighs 12 oz., 25,000 r.p.m. $18.50 postpaid with 6 Accessories.



10 Days Free Trial

Send for catalog of complete line.

CHICAGO WHEEL & MFG. CO.
Makers of Quality Products for 40 Years
1101 W. Monroe St., Dept. MM, Chicago, Ill.

this volume he was assisted by a well-known professor at Madrid University.

The book contains most of the words in common use in the three major divisions of engineering as well as many used in aviation and wireless. It also covers the language connected with electricity, the steam turbine, and the Diesel engine. The majority of the terms found in this work have been taken from the numerous specifications, catalogs, and reports of all kinds that the author has been required to translate in his dealings with both private customers and governments in South American trade. They are, therefore, a faithful reproduction of the actual expressions used in business between English and Spanish-speaking countries. The book should be invaluable to all those firms or individuals who are engaged or plan to engage in business or cultural relations with the numerous countries where Spanish is the language of the country.

Patent Fundamentals. By Adelbert Schapp, Pat. Atty. Published by The Industrial Press, 148 Lafayette St., New York, N. Y. 176 pages. Bound in cloth.

This treatise is intended particularly to aid the inventor to secure a correct understanding of the problems involved in obtaining proper patent protection, and illustrates, by numerous practical examples and thorough discussion of many important court decisions, the best and most approved ways of defining and protecting an invention.

The book will be found particularly useful by engineers and chemists who have had occasion to cooperate with patent attorneys in preparing and prosecurint patent applications. The chemist's problem is discussed and an analysis of decisions relating to chemical patents is included. The text also covers the subject of trademarks and copyrights, design patents, and prints and labels, and illustrates the different conditions under which these protective measures become available.

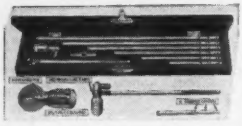
Trade Literature

Alligator Brand Files Catalog No. 5. The complete line of Alligator Swiss pattern and Du-More and Kleen-Kut American pattern files manufactured by the Carson-Newton Co., 61-71 Mill St., Belleville, N. J., is described in a 36-page illustrated catalog released by this firm. Copy free upon request.

Handbook for Operators of Acme-Gridley Multiple Spindle Bar Machines. The National Acme Company, 170 E. 131st St., Cleveland, Ohio, has issued a handbook for operators of the multiple spindle automatic screw machines built by this firm.

The volume contains 124 pages devoted to the design, construction, tools,

NEW International INSIDE MICROMETER
Quicker, Handier, Highest Accuracy, Beautiful Workmanship

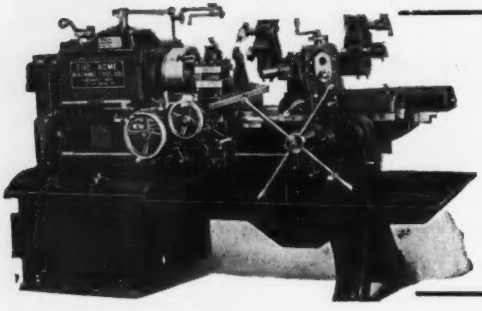


1½-12" . $7.50
1½-6" . . $5.50
Includes handle and polished hardwood case. Workmanship and accuracy unconditionally guaranteed.

International Telescope Ganges with 3" long handles. Nicely made—Range ½ to 2⅛"—set of 3—only $3.90.

Write for fully descriptive literature.

PACIFIC SPECIALTY SUPPLY CO.
344 N. Vermont Avenue, Los Angeles, Calif.



Cincinnati Acme
Universal Turret Lathes

The No. 4W Acme Universal Turret Lathe with its unusual high operating efficiency and simplified design, insures maximum production on all work within range.

Write for circular.

THE ACME MACHINE TOOL COMPANY
CINCINNATI • OHIO



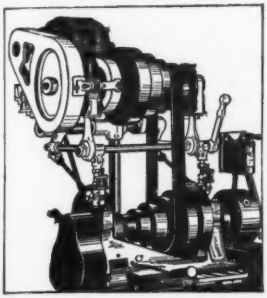
NICHOLSON EXPANDING MANDRELS—for holding any job with bores from ½" to 7" while being machined on lathes, grinders, or millers. Fourteen sizes—great time savers.

OTHER PRODUCTS: Steam Traps, Chromium Plated Steel and Stainless Steel Floats, Compressed Air Traps, Flexible Couplings, Steam and Air Separators.

CONTROL VALVES, flat disc type—for operating single and double acting air, steam, water or oil cylinders. ¼" to 1½" sizes.



W. H. NICHOLSON & CO.
136 Oregon St. Wilkes-Barre, Pa.



MOTORIZE . . . . *Speed-up!*

Double—even triple—your output with Remco Drives. The belt on a Remco Drive installation can be 200 to 300% tighter, than is possible with an overhead shaft, where the belt must be carried loose to be shifted manually from cone to cone. Investigate! Write for FREE folder. Remco Products Corp., State and Hay Sts., York, Penna.

REMCO MOTOR DRIVES
for LATHES, SHAPERS, DRILLS, MILLING MACHINES, etc.



New DIE FEED
Quickly Set Up on Any Press

Requires no connection to the power shaft of the press.

Handles coiled stock of any practical thickness. Maximum stock width 4". Can be adjusted from 0 to its maximum feed length of 3" in increments of .001".

Dickerman Die Feed equipped dies are quickly set up on any press for short runs or rush work. By leaving the Die Feed attached permanently to dies that are used frequently, great savings are made in installation time.

Send for folder No. 82 giving complete story of this new, profit-making device.

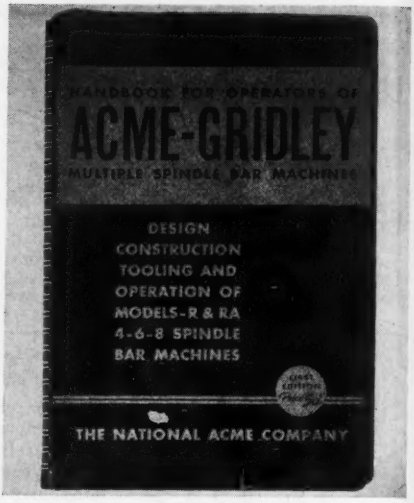
H. E. DICKERMAN MFG. CO. 282 WILBRAHAM ROAD SPRINGFIELD, MASS.

and operation of the Models R and RA four, six and eight-spindle machines. The first six pages comprise an index which is cross-indexed to every conceivable classification so that the user may quickly locate and find information on any problem that arises. A large phantom view of a machine clearly illustrates the interior construction and location of all important mechanisms.

The book is arranged in six parts. Part 1 describes and illustrates the fundamental design and operating principles which apply to the four, six and eight-spindle bar machines alike. Part 2 deals with the details of construction and includes 20 pages with 36 illustrations. The next section consists of 20 pages dealing with available tools and the wide variety of attachments.

Of highest practical value is the section devoted to estimating production, changing over jobs, setting up, and the operation of the machine in everyday practice. To avoid too much generalization, a unique plan of taking a typical piece of production work on a six-spindle machine and following through every step from preliminary calculations through camming, tooling, and adjustments for every operation in the precise order in which they should be performed has been used. This operating section also contains typical tooling set-ups on a variety of four, six and eight-spindle jobs as actually tooled for customers at the National Acme plant. Valuable suggestions regarding types of tools and attachments may be found in these illustrated set-ups.

The final section is devoted to charts and tables pertaining chiefly to the selection of cams, gears, composite dimension charts and drawings covering the tooling area of all of the machines, recommended surface feeds and speeds, r.p.m. and other tables useful to Acme-Gridley users.







The book is 6 x 9 in. in size, is printed on a paper stock especially coated to resist as far as possible grease, water and finger-printing, and is bound in a strong and tough fabricoid cover. A wire binding is used so that the book will lie flat when opened. Extra sheets can be inserted when and as issued.

The book will be sent free to foremen, set-up men, and operators actively engaged in production on the Model R and RA four, six and eight-spindle bar machines provided the request is made on the user's company letterhead. To all others, the price is fifty cents but inquiries from non-users are not solicited.

V & O Inclinable Presses. This catalog, designated as No. 39, contains illustrations and descriptions of the various types and sizes of inclinable power presses made by V & O Press Company, Hudson, N. Y. A discussion of construction features, specifications, and punching and shearing data are given. Copy free upon request.

Barrett-Cravens Junior Catalog. A 172-page "vest pocket" catalog which illustrates and describes the 176 different materials handling devices in the Barrett materials handling equipment line has been issued by Barrett-Cravens Company, 3255 W. 30th St., Chicago, Ill. Besides the line of lift trucks, portable elevators, and container storage systems, it shows the recently introduced Barrett Torpedo Electric Hoists. Copy of the "Junior Catalog No. 639" free upon request.

Mention MODERN MACHINE SHOP when sending inquiries to advertisers.

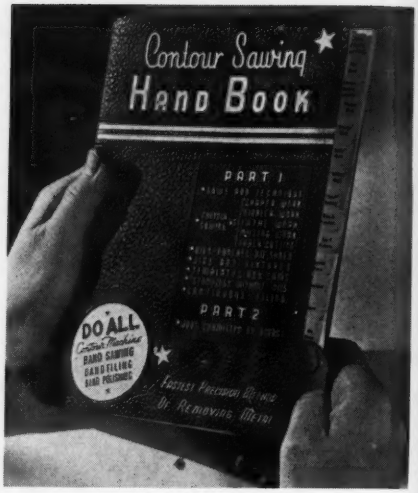
Barber-Colman Type V Vertical Hobbing Machine. Complete details regarding the Barber-Colman Type V Vertical Hobbing Machine, product of Barber-Colman Company, Rockford, Ill., are presented in a four-page folder issued by this company. The text is augmented by the use of labeled photographs which aid in the explanation of the operation and construction of the machine. Copy free upon request.



"101 Welding Ideas." A bulletin entitled "101 Welding Ideas for Low-Cost Maintenance" which illustrates and describes a wide variety of money-saving repair, fabrication and structural applications of arc welding has been published by The Lincoln Electric Company, Cleveland, Ohio.

The bulletin, which contains 16 pages 8½ x 11 in. in size, is published to show, by case studies of 101 actual maintenance jobs, just how general repair work of broken and worn parts — both structural and mechanical—and also the fabrication of replacements, piping, jigs, fixtures, and so on, is done by the electric arc process. The versatility of the process is indicated by its use in repairing parts of mild steel, high tensile steel, high manganese steel, stainless steel, chrome steel, light gauge steel, aluminum, cast iron, bronze, brass and copper, as well as applying new metal to worn parts to resist any type of wear action in service. Copy free on request.

Doall Contour Sawing Handbook. This 160-page profusely illustrated handbook published by Continental Machines, Inc., 1306 S. Washington Ave., Minneapolis,



Minn., is a text on the metal cutting process known as "Contour Sawing." It is Wire-O bound and has a fabricoid cover.

The Doall Contour Sawing Handbook contains complete data and charts, and gives detailed information relating to the operation and application of Contour Sawing. In addition, the book presents a thorough study of ways for reducing machining costs as well as newly compiled data relating to the selection and cutting speeds of saws. According to the publisher, the Doall Handbook is a source of valuable engineering data containing facts essential to the machining industry.

Copy of handbook will be sent free of charge to any mechanical executive who will address a request on his company letterhead.

TROYKE ROTARY TABLES



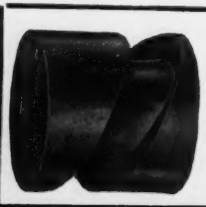
Moderately Priced.

9", 12", 15", 18", 21", 25"

With or Without Dividing Plates.
Ask your dealer or write us.

ALFRED A. TROYKE
219 E. Second St. Cincinnati, Ohio

CAMS



All sizes — shapes

• • •

Precision work on special machines, parts, jigs, tools, etc.

VARICK MACHINE & TOOL WORKS, INC.
306 HUDSON ST. • NEW YORK

PYRO THE SIMPLIFIED OPTICAL PYROMETER



Unique construction enables operator to rapidly determine temperature even on minute spots, fast moving objects or the smallest streams; no correction charts, no accessories, no upkeep.

THE PYROMETER INSTRUMENT CO.
Write for Bulletin No. 80 101-105 Lafayette St., N. Y.

Yale Electric Industrial Trucks, Hand Lift Trucks, and Skid Platforms are the subject of an attractively printed, 60-page catalog now being issued by The Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa. Yale products described and illustrated include single-stroke hand lift trucks ranging in capacity from 1,000 to 5,000 lbs.; multi-stroke hand lift trucks ranging in capacity from 2,500 to 20,000 lbs.; various types of electric trucks such as crane, fork, high lift, load carrier, low lift, ram, and special model trucks; and skid platforms of arc welded type, bolted type, cowan type, featherweight type, rollaway jack type, and so on.

Copy of catalog will be sent free of charge to any shop superintendent who will address a request on his company letterhead.

Heavy Duty Motors. Heavy duty motors of ⅛ to ½ h.p. for blowers, air compressor, small machine tools, die grinders, industrial vaccuum cleaners, and other similar applications are described in a leaflet issued by the Westinghouse Electric & Manufacturing Company. Several ratings and speeds are available in the one frame used for this type motor. A pressure-type grease cup ensures adequate lubrications. The motor has ball bearings, a cast aluminum fan for ventilation, and weighs 13 lbs., 11 oz. Copies of leaflet F-2491 may be obtained from Dept. 7-N-20, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

Republic Steel Handbook No. 39. The Union Drawn Steel Division of Republic Steel Corporation, Cleveland, Ohio, has published the fourth edition of the "Steel Handbook for Machine Tool Users." Contained in the 80 pages is general and specific information including tables of recommended cutting speeds and feeds for many grades of carbon, alloy, and stainless steel as well as other data on machining.

Copy of Steel Handbook No. 39 can be obtained free of charge by writing to Republic Steel Corporation, Advertising Division, Cleveland, Ohio.





FOR YOUR CATALOG LIBRARY

To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.

1. **Air Grinders**

Bulletin No. 19, issued by Rotor Tool Co., Cleveland, Ohio, describes complete line of Cone, 4-in., 6-in. and 8-in. air grinders.

2. **Safety Balancers**

Chicago Pneumatic Super Safety Balancers for balancing any type of portable tool, jig or fixture in its best working position are detailed in Bulletin SP-1885. Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.

3. **Hoists**

Wright Hoists are illustrated and described in The Wright Catalog available from the Wright Manufacturing Division, American Chain & Cable Co., Inc., York, Pennsylvania.

4. **Tapping Heads**

New literature showing Procunier High Speed Tapping Heads is available from Procunier Safety Chuck Co., 12 S. Clinton St., Chicago, Ill.

5. **Hardened Sleeves**

Bulletin 16-J illustrates and describes the new Midwest hardened sleeves. Midwest Tool & Mfg. Co., 2318 W. Jefferson Ave., Detroit, Michigan.

6. **Universal Turret Lathes**

An attractive 24-page catalog just released by Jones & Lamson Machine Co., Springfield, Vt., details the 8A, 8B, and 8D J & L Saddle Type Universal Turret Lathes.

7. **Hand Screw Machine**

Bulletin 918 illustrates and describes the Rivett hand screw machine for precision manufacturing of small duplicate parts. Rivett Lathe & Grinder Inc., Brighton, Boston, Massachusetts.

8. **Production Miller**

U. S. Tool Company, Inc., Ampere (East Orange), N. J., has issued Bulletin SM-36 featuring the light, high speed, production milling machine, The Multi-Miller.

9. **Portable Nibbler**

The New Thor Portable Electric Nibbler is detailed in bulletin now available from Independent Pneumatic Tool Co., 604 W. Jackson Blvd., Chicago, Illinois.

10. **Shop Equipment Tools**

Starrett Catalog No. 26-MD describes the complete line of Starrett Tools, Dial Indicators and Hacksaws. The L. S. Starrett Co., Athol, Massachusetts.

11. **Pneumatic Arbor Presses**

Hannifin Arbor Presses are presented in Bulletin 46 with complete specifications of all types. Hannifin Manufacturing Co., 621-631 S. Kolmar Ave., Chicago, Illinois.

12. **Tool Chests**

Gerstner Tool Chests are detailed in circular now available from Gerstner Tool Chests, 1239 Columbia St., Dayton, Ohio.

13. **Tap and Drill Grinder**

The Grand Rapids Motor Driven Combination Tap and Drill Grinder is illustrated and described in catalog issued by Gallmeyer & Livingston Co., 308 Straight Ave., S. W., Grand Rapids, Michigan.

14. **Belt-Lacing for V-Belts**

"Why Lace V-Belts" is explained in Bulletin No. 40-B just issued by Shippert Mfg. Co., 414 S. Galena Ave., Dixon, Ill., manufacturers of lacings for connecting V-belts made of cord, fabric, rubber or leather.

15. Oilless Bearings

A new 16-page catalog describing Metaline Oilless Bronze Bearings has just been issued by the R. W. Rhoades Metaline Company, Long Island City, New York.

16. Pipe Tools

Catalog 39, issued by The Toledo Pipe Threading Machine Co., Toledo, Ohio, details Toledo pipe and bolt threading devices, pipe cutters, reamers, pipe vises, portable work benches, boring tool, power drives, and power pipe machines.

17. Tapping Machines

A 14-page illustrated catalog has been issued by R. G. Haskins Co., 619 S. California Ave., Chicago, Ill., covering Haskins Type "C" Tapping Machines, high speed units with built-in air control.

18. Toggle-Action Clamping Tools

New 16-page Catalog No. 4 illustrates and describes Knu-Vise toggle-action clamping tools. Knu-Vise Products Co., 2855 W. Grand Blvd., Detroit, Michigan.

19. Stainless Steel Stock List

This is a handy 16-page Stocklist SS100 showing size of Rezistal sheets, bars and welding rods carried in Crucible's Mills and Branches. Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.

20. Arc Welder

The new Wilson "Hornet" Arc Welder is featured in a new bulletin published by Wilson Welder and Metals Co., Inc., 60 E. 42nd St., New York, N. Y.

21. Gears and Gear Units

Farrel-Birmingham Company, Inc., 381 Vulcan St., Buffalo, N. Y., has available Catalog No. 483 containing valuable information for all gear users.

22. Flexible Shafts and Machines

N. A. Strand & Co., 5001 N. Wolcott Ave., Chicago, Ill., has issued Catalog No. 27 containing 72 pages of illustrations, descriptions, and specifications of Strand equipment.

23. Drill Presses

A new drill press book containing specifications and prices of complete line of Delta Drill Presses is offered by Delta Mfg. Co., 667 E. Vienna Ave., Milwaukee, Wisconsin.

24. Rotary Tables

Stevens Rotary Tables, standard and dial types, are illustrated and described in circular available from John B. Stevens, Inc., 306 Hudson St., New York, N. Y.

25. Collet Chucks

A new bulletin featuring Universal Collet Chucks has been released by Universal Engineering Co., Frankenmuth, Michigan.

Print plainly in filling out coupon for literature.

MODERN MACHINE SHOP
431 Main St., Cincinnati, Ohio

I am interested in receiving the following literature reviewed in your January issue.

No...... **No.**..... **No.**..... **No.**..... **No.**.....

(Insert numbers denoting literature you want.)

Name..... **Title**.....

Company .....

Company Address .....

City..... **State**.....

SERVICES DIRECTORY

GRINDING • STAMPINGS • TOOL and DIE WORK
MACHINE WORK • CASTINGS • HEAT-TREATING
FORGINGS • EMPLOYMENT • BUSINESS • ETC.



for best results
at lowest cost
advertise your service
in the

SERVICES DIRECTORY
OF
MODERN MACHINE SHOP

RATES ON REQUEST

DESIGNING AND MANUFACTURING OF METAL SPECIALTIES

Stamping, Machining, Model Making, Spot Welding, Special Order Production in Large or Small Runs, Electrical Specialties.

GERDING BROTHERS
Third and Vine Sts. Cincinnati, Ohio

Centerless Grinding
(CONTRACT WORK)
Precision, Fine Finish, Low Cost
May we quote on your specifications?
THE HEIM COMPANY
Fairfield • Connecticut

DIES, JIGS AND FIXTURES

Large or Small Designed and Built. Commercial Jig Boring at reasonable prices. Prompt service. Let us quote.

QUALITY TOOL & DIE CO.
403 N. Noble St. • Indianapolis, Ind.
RAY W. RICE, *Mgr.*

CENTERLESS GRINDING

Straight—Tapered—Double Diameter
Shoulder and Profile Diameter
Internal Grinding—External Grinding
Taper and Straight Dowel Pins Made to Order
Screw Machine Products Heat-Treated
Before Grinding If Necessary
Industrial Centerless Grinding Co.
14640 Schaefer Road Detroit, Mich.

PATTERNS

Wood and Metal — also Match Plates. For all kinds of castings—large or small.

Estimates on Request.

GENERAL PATTERN WORKS
2231 Buck St. North of Harrison Ave.
Cincinnati, Ohio Phone MAin 4751

GRIND THE
EASTERN CENTERLESS WAY

Accuracy—Fine Finish—Low Cost
Large or Small Lots

EASTERN CENTERLESS GRINDING CO.
628 Capitol Ave. • Hartford, Conn.

AUTOMATIC AND HAND SCREW MACHINE PRODUCTS

. . . up to 2¼" diameter—any material—*small* or *large* quantities. Prompt service.

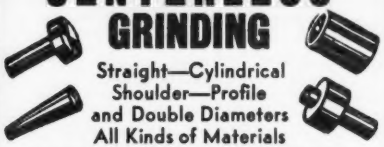
IMSANDE SCREW PRODUCTS CO.
3517 CARDIFF AVE., OAKLEY, CINCINNATI, O.

CENTERLESS GRINDING

Since 1925

CINCINNATI
ICE PICK & TONG MFG. CO.
118 BURROWS ST. • CINCINNATI, O.

CENTERLESS GRINDING



Straight—Cylindrical
Shoulder—Profile
and Double Diameters
All Kinds of Materials

SCREW MACHINE PRODUCTS

Heat Treated and Ground If Necessary

Improved and expanded facilities insure prompt and accurate service.

Send blueprints or samples for estimates.

PORTER MACHINE CO.

3120 FORRER AVE. CINCINNATI, OHIO

DIE CASTINGS

PARKER

SINCE **ERIE** 1906

Zinc Base Die Castings

PARKER WHITE-METAL AND MACHINE CO.

ERIE, PA.

STAMPINGS IN SMALL LOTS

Special: Total die and stamping cost for 1,000 flat blanks most any shape up to 10 sq. in.....$25.00

We can save you money on all types of sheet metal parts in small quantities. All types of dies designed and built.

SOUTHERN PRODUCTS

DEPT. M41 INDEPENDENCE, MO.



Dearborn Automatic Chucking and Indexing Fixture for use on milling machines is the subject of a four-page folder published by J. W. Dearborn, 70 S. Cliff St., Ansonia, Conn. The fixture is said to meet the demand for automatic chucking and indexing, permitting several operations on the same piece with only one setting. Simplicity of design, high precision, milling accuracy, and speed of operation are features of the device. Copy free upon request.

J & L Ram Type Universal Turret Lathes Nos. 3, 4, and 5 are the subject of a 24-page, Wire-O bound catalog distributed by the Jones & Lamson Machine Co., Springfield, Vt. This catalog is divided into three sections, each containing general specifications, illustrations, and a description of one of the lathes. In addition, construction features of the ram type lathes are described and illustrated in detail. Also included in the catalog are several pages covering the line of standard J & L turret lathe tools.

Copy free to any mechanical executive who will address a request on his company letterhead.

Established organization enjoying good reputation and credit standing is desirous to obtain for sale any worthwhile products, preferably in the machinery line.

We maintain for display and practical demonstration here in New York fine centrally located showroom. Excellent connection for reputable manufacturers.

Box No. 5, MODERN MACHINE SHOP, 431 Main St., Cincinnati, Ohio.

"There's One in Every Shop" *By Wesser*



T-J Remote Controls. A 12-page bulletin on T-J Pneumatic Remote Control Systems has been released by The Tomkins-Johnson Co., 617 N. Mechanic St., Jackson, Mich. This bulletin explains the uses and advantages of available units and includes application illustrations and installation diagrams. Copy free upon request.

Broaching Six Surfaces on four sides on a cast iron automobile valve rocker shaft support in a "Cincinnati" No. 2-36 Vertical Hydro-Broach is the subject of a four-page folder distributed by The Cincinnati Milling Machine Co., Cincinnati, Ohio. The production on this job is 612 pieces per 52-minute hour. Copy of the folder free upon request.

NEW... BETTER!

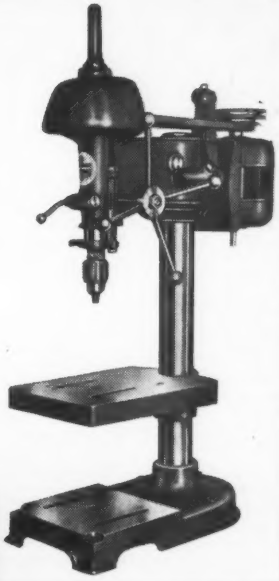
5 BIG IMPROVEMENTS

—make the 15" Walker-Turner Bench Drill "tops" in its class

This new 15" Bench Drill Press—No. 950—has all the advantages of its popular predecessor . . . *plus* these 5 valuable new features available in no other drill press at the price:

1. *Extra Big Table*—10"x12½" instead of 10"x9"! Larger than tables on presses selling much higher.
2. *All-Steel Pilot Wheel Feed* with calibrated depth stop. Heavy, quadruple-rod construction for rapid, positive action.
3. *10 Speeds* available through use of special multi-speed attachment. Four standard speeds.
4. *Adjustable Spring Return* on spindle. Soft yet positive action.
5. *Takes No. 1 Morse Taper Drills* through use of special adapter now available.

See it at your local Walker-Turner distributor's showroom. Write for his name and new catalog containing all details. Walker-Turner Co., Inc., 710 Berckman St., Plainfield, N. J.



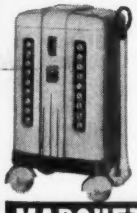
WALKER-TURNER

LIGHT MACHINES FOR INDUSTRY



WITH THE MARQUETTE A.C. ARC WELDER

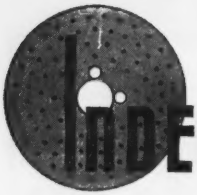
AND THE *New* MARQUETTE ARC TORCH



Ask about the Marquette A. C. Arc Welder. Five Models at five prices.

Aluminum, bronze, copper, pot metal, nickel, silver and other non-ferrous metals are easily welded by the New Marquette Arc Torch and A. C. Welder. In addition you can do general heating, preheating, brazing, soldering and hard surfacing. Your present A. C. welder or a new Marquette A. C. Arc Welder plus the Marquette Arc Torch makes your equipment so versatile that you can do most jobs formerly requiring more expensive welding methods. Maintenance and production costs will go down when you equip your plant with the new Marquette Arc Torch. For full details write Dept. E.

MARQUETTE MANUFACTURING CO., INC. MINNEAPOLIS, MINN.



INDEX TO ADVERTISEMENTS

Abrasive Machine Tool Co. 192
Abrasive Products, Inc. 139
Acme Industrial Company 183
Acme Machine Tool Co., The 210
Air-Way Pump & Equipment Co. 212
Alco Tool Co., The 42
American Engineering Company 188
American Swiss File & Tool Co. 147
American Tool Works Co., The 80
Ames Company, B. C. 146
Anderson Bros. Mfg. Co 191
Arguto Oilless Bearing Co. 196
Armstrong-Blum Mfg. Co. 129
Armstrong Bros. Tool Co. 60
Atlas Press Co. 47
Auburn Ball Bearing Co. 179
Auto Moulding & Mfg. Co. 195

Bantam Bearings Corporation 153
Barber-Colman Company 24
Bath & Co., Inc., John 133
Baumbach Mfg. Co., E. A. 169
Bay State Abrasive Products Co. 39
Bergram Mechanical Engineering Co., Inc. 159
Besly & Co., Charles H. 26
Bijur Lubricating Corp. 107
Black Diamond Saw & Machine Works, Inc. 138
Boyar-Schultz Corporation 180, 202
Boye & Emmes Machine Tool Co., The 144
Bridgeport Machines, Inc. 28
Brown & Sharpe Mfg. Co. 38, 215
Bryant Chucking Grinder Co. 52
Buffalo Forge Company 51
Burke Machine Tool Co. 159

Carboloy Company, Inc. 4, 197
Carborundum Company, The 43
Carroll & Jamieson Machine Tool Co., The 156
Carson-Newton Co. 190
Cerro de Pasco Copper Corp. 118
Chicago Gear Works 198
Chicago Pneumatic Tool Co. 93
Chicago Wheel & Mfg. Co. 209
Cincinnati Bickford Tool Co., The 73
Cincinnati Gear Company, The 194
Cincinnati Grinders Incorporated 6, 7
Cincinnati Planer Co., The 58
Cincinnati Shaper Company, The 75
Cincinnati Tool Co., The 183
Circular Tool Company, Inc. 167
Clemson Bros. Inc. 195
Cleveland Twist Drill Company 141
Cleveland Wire Spring Co., The 205
Climax Molybdenum Company 145
Commercial Centerless Grinding Co. 191
Continental Machines, Inc. 157
Crafts Company, Inc., Arthur A. 183
Crucible Steel Co. of America 17
Cullman Wheel Company 175

Danly Machine Specialties, Inc. 199
Davis Boring Tool Co. 135
Davis Keyseater Company 163
Dearborn, J. W. 175
Dearborn Gage Company 166
Delta Manufacturing Co. 8, 9
Denison Engineering Company 170
Desmond-Stephan Mfg. Co., The 201
Detroit Bevel Gear Co. 193
Dickerman Mfg. Co., H. E. 211
Dreis & Krump Mfg. Co. 165
Dremel Mfg. Co. 191
Dumore Company, The 45

Ettco Tool Co. Inc. 36
Ex-Cell-O Corporation 21

Famco Machine Company 164
Farrel-Birmingham Company, Inc. 20
Fellows Gear Shaper Company, The 11
Felters Company, The 53
Flynn Mfg. Co. 199
Foote-Burt Company, The 22
Ford Mfg. Co., M. A. 184
Fosdick Machine Tool Co., The 14
Frick-Gallagher Mfg. Co., The 205
Fulflo Specialties Co., Inc., The 126

Gallmeyer & Livingston Co. 116
Gammons-Holman Co., The 173
Gear Specialties Incorporated 175
General Engineering & Mfg. Co. 157
Gerstner & Sons, H. 194
Geometric Tool Company, The 50
Giern & Anholtt Tool Co. 189
Gisholt Machine Company 88
Grant Mfg. & Machine Co., The 157
Gray Machine Co. 146
Greenerd Arbor Press Co. 134
Greenfield Tap & Die Corporation 111
Grinding Machinery Co. 199
Grobet File Corp. of America 206, 207
Gwilliam Company, The 177

Hannifin Manufacturing Company 97
Heald Machine Company, The 85
Hendey Machine Company, The 55
Hjorth Lathe & Tool Company 200
Hollands Manufacturing Co. 100
Holo-Krome Screw Corp., The 91

Ideal Tool Company 205
Illinois Tool Works ..... Third Cover, 161
Independent Pneumatic Tool Co. 15

Janette Manufacturing Company 207
Johnson Bronze Company 125

Kar Engineering Co., Inc. 32
Kearney & Trecker Corporation 71

Landis Machine Company, Inc. 2, 3
Landis Tool Company 23
LeBlond Machine Tool Co., The R. K. 57
Lee & Son Co., K. O. 162

Leiman Bros. Inc. 178
Lewthwaite Machine Company, T. H. 201
Lima Armature Works, Inc. 136
Loganaport Machine, Inc. ..... Second Cover
Lucas & Son, Inc., J. L. 191
Lufkin Rule Co., The 197
Luma Electric Equipment Co. 181

McCrosky Tool Corp. 115
McGill Mfg. Co. 149
McKenna Metals Company 167
Madison-Kipp Corporation 98
Marquette Mfg. Co. 221
Metal Carbides Corporation 196
Midwest Tool & Mfg. Co. 131
Monarch Machine Tool Co., The 27
Morse Twist Drill and Machine Co. 16
Mummert-Dixon Company 193
Murchey Machine & Tool Co. 177

National Acme Company, The 102, 103
National Twist Drill & Tool Co. 197
New Departure Mfg. Co. ..... Fourth Cover
New Method Steel Stamps, Inc. 194
Nicholson & Co., W. H. 211
Nicholson File Company 101
Nielsen Tool & Die Co. 204
Norma-Hoffmann Bearings Corp., ... First Cover
North Bros. Mfg. Co. 119
Norton Company 112, 113
Numberall Stamp & Tool Co. Inc. 185

Oliver Instrument Company, Inc. 33
Oslund Tool & Die Co. 203
Oster Manufacturing Co., The 29
Owatonna Tool Company 171

Pacific Specialty Supply Company 210
Parker-Kalon Corporation 155
Pittsburgh Stamp Company, Inc. 205
Pratt & Whitney Company 41
Procunier Safety Chuck Co. 127
Production Equipment Co., The 182
Production Machine Company 199
Progressive Tool & Cutter Co. 185
Prosser & Son, Thomas 169
Pure Oil Company, The 198
Pyrometer Instrument Co., The 214

Racine Tool and Machine Co. 207
Rasmussen Machine Co., Inc. 49
Reid Bros. Co., Inc. 174
Remco Products Corp. 211
Rickert-Shafer Company 95
Rivett Lathe & Grinder Inc. 10
Rockford Machine Tool Company 46
Ross Operating Valve Co. 121
Rotor Tool Company 87
Russell Electric Co. 212
Ruthman Machinery Co., The 187

S & S Machine Works 201
Saroston Co., The 187
Savage Company, W. J. 192
Schauer Machine Co. 171
Scherr Company, Inc., George 224
Schmidt, Inc., Geo. T. 122, 165
Scully-Jones & Co. 213
Seneca Falls Machine Co. 25
Services Directory 218, 219
(Centerless Grinding, Die Castings, Contract Work, etc.)
Severance Tool Mfg. Co. 181
Shakeproof Lock Washer Company 117
Sheldon Machine Co. Inc. 30
Simonds Saw and Steel Co. 81
Smith & Mills Co. 159
Smith Power Transmission Co., The 163
South Bend Lathe Works 19
Stackbin Corporation 189
Standard Electrical Tool Co., The 201
Standard Pressed Steel Co. 195, 203, 224
Stanley Works, The 34
Staples Tool & Engineering Co., The ... 168
Star Machine & Engineering Corp. 193
Stark Tool Company 161, 190
Starrett Company, The L. S. 79
Steege Machinery Co., W. L. 189
Sterling Products Company 161
Stevens, Inc., John B. 187
Strand & Co., N. A. 120
Strong, Carlisle and Hammond Co, The 171
Sturdimatic Tool Company 208
Sunnen Products Company 48
Sutton Tool Company 179

Tannewitz Works, The 158
Texas Company, The 12, 13
Thompson Grinder Company, The 56
Timken Roller Bearing Company, The .. 1
Titan Tool Company 189
Toledo Pipe Threading Machine Co, The 167
Tomkins-Johnson Company, The 123
Trico Fuse Mfg. Company 203
Troyke, Alfred A. 214
Tubular Rivet & Stud Co. 173

Union Drawn Steel Company 137
Union Twist Drill Co., Butterfield Division 193
United States Drill Head Co. 179
United States Electrical Tool Co., The .. 54
U. S. Tool Company, Inc. 31
Universal Engineering Company ... 124, 176

V & O Press Company, The 204
Van Norman Machine Tool Co. 18
Varick Machine & Tool Works 214
Victor Machinery Exchange, Inc. 151
Vimco Manufacturing Company 169

Walker Co., Inc., O. S. 59
Walker-Turner Co., Inc. 221
Walls Sales Corporation 177
Waltham Machine Works 163
Walton Company, The 181
Wardwell Mfg. Co., The 165
Warner & Swasey Co. 77
Watts Bros. Tool Works 197
Wells Manufacturing Corp. 44
Westlof Tool & Die Co. 186
Wheel Trueing Tool Co., Inc. 173
Wheelock, Lovejoy & Company 172
Whitney Metal Tool Company 187
Wicaco Machine Corporation, The 40
Williams & Co., J. H. 37
Wilson Mechanical Instrument Co. 109
Wood & Spencer Co., The 185
Wright Manufacturing Division of American Chain & Cable Co., Inc. 99

Yale & Towne Mfg. Co. 35

Zagora Machine & Gear Co., J. 168
Zeh & Hahnemann Co. 203
Ziegler Tool Company, W. M. 209

Choose "HALLOWELL" STEEL STOOLS for { low cost / long wear



Fig. 1334
Pat. appl'd. for

Representing up-to-the-minute seating equipment, "Hallowell" Steel Stools belong in modern machine shops—in your shops. Their all welded construction is your assurance of lasting value, for there are lifetimes of rigidity built into everyone. The complete range of styles and models makes it possible for you to fill all your seating needs with "Hallowells." Get a copy of our catalog that describes the whole line.



Fig. 1249
Pat. app. for

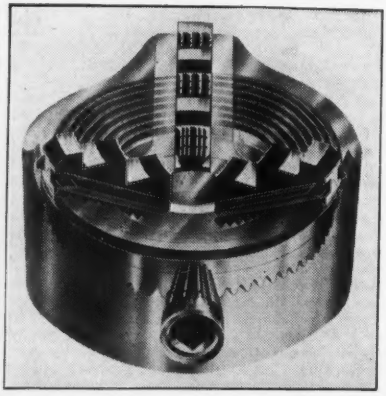
STANDARD PRESSED STEEL CO.

BRANCHES
BOSTON
DETROIT
INDIANAPOLIS

JENKINTOWN, PENNA.
BOX 556

BRANCHES
CHICAGO
ST. LOUIS
SAN FRANCISCO

Dissatisfied With Chuck Performance?
Investigate The Taylor Super-Power Chuck



- Will outlast two ordinary scroll chucks.
- Unsurpassed gripping power—no danger of slipping on heavy multi-cut work.
- Retains accuracy indefinitely.
- Increased speeds, heavier feeds possible without endangering expensive tungsten carbide cutting tools.
- Cuts out high costs of repair parts of most chucks on the market.
- Only chuck with all moving parts hardened and ground.

Certainly this superior chuck deserves your investigation. New 18-page catalog gives all the facts. Write for your copy today.

GEORGE SCHERR CO. 130 Lafayette St. New York, N. Y.

The Human Side of Tools!



.... A FRIEND INDEED!

When tooling problems arise, it's a real help to have readily available a tool engineer who is qualified to take such problems off your mind. And—you are doubly fortunate when that man, through years of close contact with production problems in scores of industries, can make practical suggestions that result in increased efficiency or reduced cost.

This is the type of helpful counsel that the field staff of the Illinois Tool Works are giving to their customers daily. It typifies the spirit that has prevailed in every department of our organization since its founding. We call it—"The Human Side of Tools!"

ILLINITE

HIGH SPEED PRODUCTION TOOLS

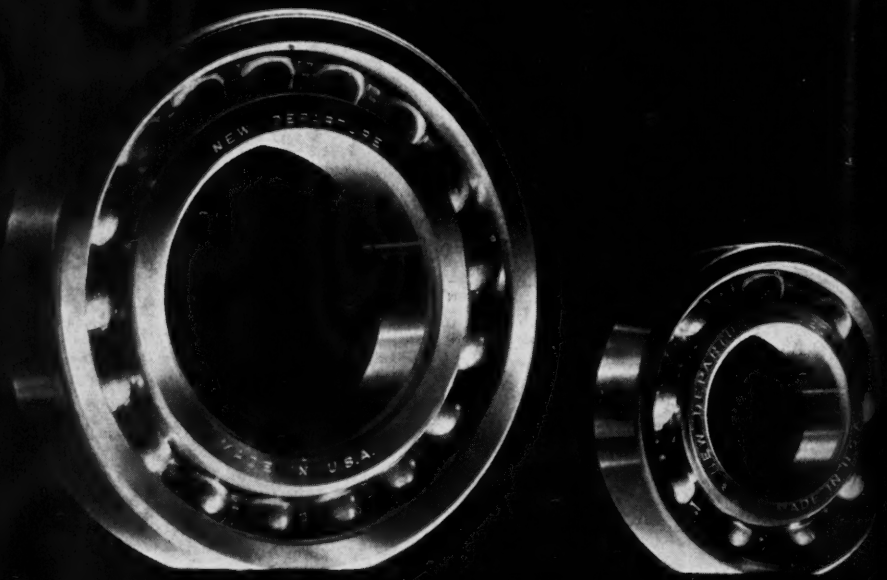
Milling Cutters
Ground Hobs
Broaches
Shaper Cutters
Ground Form Tools
Special Tools
Die Filing Machines
Gear Measuring Machines

ILLINOIS TOOL WORKS

MANUFACTURERS OF HIGH SPEED PRODUCTION TOOLS AND SHAKEPROOF PRODUCTS

2501 N. KEELER AVENUE, CHICAGO, ILLINOIS · IN CANADA: CANADA ILLINOIS TOOLS, LTD., TORONTO, ONTARIO

Copyright 1940, Illinois Tool Works



UNIFORMITY . . .
The Seed of Dependability

The uniform precision and endurance of New Departure *forged steel* ball bearings is not simply a matter of grinding parts to microscopic tolerances — it is the *final result* of exact control of accuracy at more than one hundred operations from steel to completed bearing

NEW DEPARTURE

NEW DEPARTURE · DIVISION OF GENERAL MOTORS · BRISTOL, CONNECTICUT

Indicate on the coupon the number of the item in which you are interested and mail as directed.

1. **Air Grinders**

Bulletin No. 19, issued by Rotor Tool Co., Cleveland, Ohio, describes complete line of Cone, 4-in., 6-in. and 8-in. air grinders.

2. **Safety Balancers**

Chicago Pneumatic Super Safety Balancers for balancing any type of portable tool, jig or fixture in its best working position are detailed in Bulletin SP-1885. Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.

3. **Hoists**

Wright Hoists are illustrated and described in The Wright Catalog available from the Wright Manufacturing Division, American Chain & Cable Co., Inc., York, Pennsylvania.

4. **Tapping Heads**

New literature showing Procunier High Speed Tapping Heads is available from Procunier Safety Chuck Co., 12 S. Clinton St., Chicago, Ill.

5. **Hardened Sleeves**

Bulletin 16-J illustrates and describes the new Midwest hardened sleeves. Midwest Tool & Mfg. Co., 2318 W. Jefferson Ave., Detroit, Michigan.

6. **Universal Turret Lathes**

An attractive 24-page catalog just released by Jones & Lamson Machine Co., Springfield, Vt., details the 8A, 8B, and 8D J & L Saddle Type Universal Turret Lathes.

7. **Hand Screw Machine**

Bulletin 918 illustrates and describes the Rivett hand screw machine for precision manufacturing of small duplicate parts. Rivett Lathe & Grinder Inc., Brighton, Boston, Massachusetts.

8. **Production Miller**

U. S. Tool Company, Inc., Ampe (East Orange), N. J., has issue Bulletin SM-36 featuring the ligh high speed, production milling ma chine, The Multi-Miller.

9. **Portable Nibbler**

The New Thor Portable Electr Nibbler is detailed in bulletin no available from Independent Pne matic Tool Co., 604 W. Jack Blvd., Chicago, Illinois.

10. **Shop Equipment Tools**

Starrett Catalog No. 26-MD d scribes the complete line of Starr Tools, Dial Indicators and Ha saws. The L. S. Starrett C Athol, Massachusetts.

11. **Pneumatic Arbor Presses**

Hannifin Arbor Presses are presen ed in Bulletin 46 with comple specifications of all types. Hanni Manufacturing Co., 621-631 S. K mar Ave., Chicago, Illinois.

12. **Tool Chests**

Geratner Tool Chests are detailed circular now available from Ger ner Tool Chests, 1239 Columbia S Dayton, Ohio.

13. **Tap and Drill Grinder**

The Grand Rapids Motor Drive Combination Tap and Drill Grind is illustrated and described in cat log issued by Gallmeyer & Livin ston Co., 308 Straight Ave., S. W Grand Rapids, Michigan.

14. **Belt-Lacing for V-Belts**

"Why Lace V-Belts" is explain in Bulletin No. 40-B just issued Shippert Mfg. Co., 414 S. Gale Ave., Dixon, Ill., manufacturers lacings for connecting V-belts ma of cord, fabric, rubber or leather.

ers, pipe vises, portable work benches, boring tool, power drives, and power pipe machines.

17. **Tapping Machines**
A 14-page illustrated catalog has been issued by R. G. Haskins Co., 619 S. California Ave., Chicago, Ill., covering Haskins Type "C" Tapping Machines, high speed units with built-in air control.

18. **Toggle-Action Clamping Tools**
New 16-page Catalog No. 4 illustrates and describes Knu-Vise toggle-action clamping tools. Knu-Vise Products Co., 2855 W. Grand Blvd., Detroit, Michigan.

19. **Stainless Steel Stock List**
This is a handy 16-page Stocklist 88100 showing size of Rezistal sheets, bars and welding rods carried in Crucible's Mills and Branches. Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.

22. **Flexible Shafts and Machines**
N. A. Strand & Co., 5001 N. Wolcott Ave., Chicago, Ill., has issued Catalog No. 27 containing 72 pages of illustrations, descriptions, and specifications of Strand equipment.

23. **Drill Presses**
A new drill press book containing specifications and prices of complete line of Delta Drill Presses is offered by Delta Mfg. Co., 667 E. Vienna Ave., Milwaukee, Wisconsin.

24. **Rotary Tables**
Stevens Rotary Tables, standard and dial types, are illustrated and described in circular available from John B. Stevens, Inc., 306 Hudson St., New York, N. Y.

25. **Collet Chucks**
A new bulletin featuring Universal Collet Chucks has been released by Universal Engineering Co., Frankenmuth, Michigan.

Print plainly in filling out coupon for literature.

MODERN MACHINE SHOP
431 Main St., Cincinnati, Ohio

I am interested in receiving the following literature reviewed in your January issue.

No...... **No.**..... **No.**..... **No.**..... **No.**.....
(Insert numbers denoting literature you want.)

Name..... **Title**.....

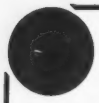
Company .....

Company Address .....

City..... **State**.....

SERVICES DIRECTORY

GRINDING • STAMPINGS • TOOL and DIE WORK
MACHINE WORK • CASTINGS • HEAT-TREATING
FORGINGS • EMPLOYMENT • BUSINESS • ETC.



for best results
at lowest cost
advertise your service
in the

SERVICES DIRECTORY
OF
MODERN MACHINE SHOP
RATES ON REQUEST

DESIGNING AND MANUFACTURING OF METAL SPECIALTIES

Stamping, Machining, Model Making, Spot Welding, Special Order Production in Large or Small Runs, Electrical Specialties.

GERDING BROTHERS
Third and Vine Sts. Cincinnati, Ohio

Centerless Grinding
(CONTRACT WORK)
Precision, Fine Finish, Low Cost
May we quote on your specifications?
THE HEIM COMPANY
Fairfield • Connecticut

DIES, JIGS AND FIXTURES

Large or Small Designed and Built. Commercial Jig Boring at reasonable prices. Prompt service. Let us quote.

QUALITY TOOL & DIE CO.
403 N. Noble St. • Indianapolis, Ind.
RAY W. RICE, *Mgr.*

CENTERLESS GRINDING

Straight—Tapered—Double Diameter
Shoulder and Profile Diameter
Internal Grinding—External Grinding
Taper and Straight Dowel Pins Made to Order
Screw Machine Products Heat-Treated Before Grinding If Necessary
Industrial Centerless Grinding Co.
14640 Schaefer Road Detroit, Mich.

PATTERNS

Wood and Metal — also Match Plates. For all kinds of castings—large or small.

Estimates on Request.

GENERAL PATTERN WORKS
2231 Buck St. North of Harrison Ave.
Cincinnati, Ohio Phone MAin 4751

GRIND THE
EASTERN CENTERLESS WAY
Accuracy—Fine Finish—Low Cost
Large or Small Lots
EASTERN CENTERLESS GRINDING CO.
628 Capitol Ave. • Hartford, Conn.

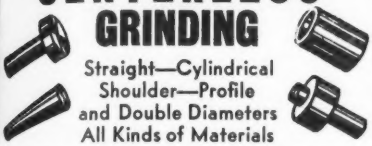
AUTOMATIC AND HAND SCREW MACHINE PRODUCTS

. . . up to 2¼" diameter—any material—*small or large* quantities. Prompt service.

IMSANDE SCREW PRODUCTS CO.
3517 CARDIFF AVE., OAKLEY, CINCINNATI, O.

CENTERLESS GRINDING
Since 1925
CINCINNATI
ICE PICK & TONG MFG. CO.
118 BURROWS ST. • CINCINNATI, O.

CENTERLESS GRINDING



Straight—Cylindrical
Shoulder—Profile
and Double Diameters
All Kinds of Materials

SCREW MACHINE PRODUCTS
Heat Treated and Ground If Necessary

Improved and expanded facilities insure prompt and accurate service.

Send blueprints or samples for estimates.

PORTER MACHINE CO.
3120 FORRER AVE. CINCINNATI, OHIO

DIE CASTINGS

PARKER

SINCE **ERIE** 1906

Zinc Base Die Castings

PARKER WHITE-METAL AND MACHINE CO.
ERIE, PA.

STAMPINGS IN SMALL LOTS
Special: Total die and stamping cost for 1,000 flat blanks most any shape up to 10 sq. in.....$25.00
We can save you money on all types of sheet metal parts in small quantities.
All types of dies designed and built.
SOUTHERN PRODUCTS
DEPT. M41 INDEPENDENCE, MO.



Dearborn Automatic Chucking and Indexing Fixture for use on milling machines is the subject of a four-page folder published by J. W. Dearborn, 70 S. Cliff St., Ansonia, Conn. The fixture is said to meet the demand for automatic chucking and indexing, permitting several operations on the same piece with only one setting. Simplicity of design, high precision, milling accuracy, and speed of operation are features of the device. Copy free upon request.

J & L Ram Type Universal Turret Lathes Nos. 3, 4, and 5 are the subject of a 24-page, Wire-O bound catalog distributed by the Jones & Lamson Machine Co., Springfield, Vt. This catalog is divided into three sections, each containing general specifications, illustrations, and a description of one of the lathes. In addition, construction features of the ram type lathes are described and illustrated in detail. Also included in the catalog are several pages covering the line of standard J & L turret lathe tools.

Copy free to any mechanical executive who will address a request on his company letterhead.

Established organization enjoying good reputation and credit standing is desirous to obtain for sale any worthwhile products, preferably in the machinery line.

We maintain for display and practical demonstration here in New York fine centrally located showroom. Excellent connection for reputable manufacturers.

Box No. 5, MODERN MACHINE SHOP, 431 Main St., Cincinnati, Ohio.



T-J Remote Controls. A 12-page bulletin on T-J Pneumatic Remote Control Systems has been released by The Tomkins-Johnson Co., 617 N. Mechanic St., Jackson, Mich. This bulletin explains the uses and advantages of available units and includes application illustrations and installation diagrams. Copy free upon request.

Broaching Six Surfaces on four sides on a cast iron automobile valve rocker shaft support in a "Cincinnati" No. 2-36 Vertical Hydro-Broach is the subject of a four-page folder distributed by The Cincinnati Milling Machine Co., Cincinnati, Ohio. The production on this job is 612 pieces per 52-minute hour. Copy of the folder free upon request.